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WELLS (H. D.) & MCGILL (J. F.). **NK-37 Bermudagrass is highly susceptible to Helminthosporium stenospilum.**—*Agron. J.*, **51**, 10, p. 625, 1 fig., 1959.

In June and July 1958 reports were received at the Ga Coastal Plain Exp. Sta. that pilot plantings of NK-37 Bermuda grass (*Cynodon* sp.) in SE. United States were severely damaged by *H. stenospilum* [cf. **36**, 650]. In Calhoun County the fungus was fruiting abundantly on all the older lesions in one planting, but another of the Coastal var. adjacent to it, though bearing a limited amount of spot on the lower leaves, was not visibly reduced in productivity.

At the Station, 15 pasture and hay type vars. and selections in 3 replicates all bore leaf-spots characteristic of *H. rostratum* [cf. below], *H. cynodontis*, and *H. stenospilum* in varying amounts. Damage from any one organism was not usually considerable enough to justify rating each organism separately. NK-37 was the most susceptible of all the vars., rating 5 (heavy infection, with death of leaves) on a scale 0–5; limited infection by *H. rostratum* was found in association with abundant *H. stenospilum*.

WHITEHEAD (M. D.) & CALVERT (O. H.). **Helminthosporium rostratum inciting ear rot of Corn and leaf-spot of thirteen grass hosts.**—*Phytopathology*, **49**, 12, pp. 817–820, 7 fig., 1959.

At Miss. agric. Exp. Sta., Columbia, cross inoculations showed that *H. rostratum* [**26**, 337; **36**, 666 and above] infects a range of grass hosts, which are named, in addition to maize. Resistant and susceptible strains of *Cynodon dactylon* were noted.

MONTEMARTINI (A.). **La sindrome virosica del mosaico delle nervature del Trifoglio ladino in Italia.** [The virus syndrome of Ladino Clover vein mosaic.]—*Atti Ist. bot. Univ. Pavia*, Ser. 5, **16**, pp. 353–360, 2 pl., 1959. [Engl. summ. 16 ref.]

A virus disease resembling red clover vein mosaic virus was observed by the author on *Trifolium repens* var. *giganteum* near Pavia and was reported also in Italy from the provinces of Alessandria and Vercelli. Three groups of symptoms occurred in succession, and were sometimes followed by 2 further aberrant stages.

The most general symptom was a chlorotic spotting on and between the leaf veins irregularly distributed along the midrib but also following the secondary veins, often with a diffuse marginal chlorosis. In the 2nd stage a slight wrinkling, mainly interveinal, appeared which in the 3rd stage worsened and became a series of protuberances running along the secondary veins. In the 4th stage the white discoloration became much more evident, marking a transition between the 1st and the 5th stages, which was a more severe form of stage 4; the plants were sickly, small, dwarfed, and frequently had atrophied leaves. It is possible that some of the symptoms may be caused by white clover mosaic virus [pea mottle virus: cf. **30**, 325].

BAXTER (L. W.) & MCGLOHON (N. E.). **A method of freeing White Clover plants of Bean yellow mosaic virus.**—*Phytopathology*, **49**, 12, pp. 810–811, 1959.

At S. Carol. agric. Exp. Sta., Clemson, 362 terminal cuttings (1 cm. long or less), from 45 white clover clones grown at 10° C., were rooted during 6 weeks at 10° in diffuse fluorescent light, and then grown on for 6 weeks in the greenhouse at 25°; 126 proved free from bean yellow mosaic virus [cf. **37**, 732] when indexed on Bountiful beans [*Phaseolus vulgaris*], as opposed to only 18 of 317 cuttings from field-grown plants. Some clones were more readily freed from virus than others and 2

clones gave more virus-free cuttings in the field than in the cold, possibly because their physiology favoured virus multiplication at lower temps. than in other clones, but not at the high temp. in the field.

SANDER (EVAMARIE). **Biological properties of Red Clover vein mosaic virus.**—*Phytopathology*, **49**, 11, pp. 748–754, 1959. [27 ref.]

A more detailed account of information already noticed [**38**, 700].

GRAHAM (J. H.) & NEWTON (R. C.). **Relationship between root feeding insects and incidence of crown and root rot in Red Clover.**—*Plant Dis. Reptr*, **43**, 10, pp. 1114–1116, 1959.

The results of 2 greenhouse experiments at Univ. Park, Pa, indicated a relationship between injury and the incidence of crown and root rot (*Fusarium* spp., predominantly *F. roseum*) [**37**, 547; **39**, 27, 232] in inoculated soil. There was a noticeable difference between the effect of mechanical injury, which may heal before infection, and that due to insects, affording a continuous means of entry. Most rot developed in association with clover borer (*Hylastinus obscurus*), less with *Sitonia hispidula*, and very little in non-injured plants. Incidence was relatively high when crowns and roots grown in *Fusarium*-infested soil were injured mechanically, while there was hardly any rot in steamed soil. There was a reduction in vigour in plants infested with the 2 insects. An internal breakdown of unknown origin occurred in the crown tissue in all treatments.

KOIVISTOINEN (P.), RISSA (E.), & POHJAKALLIO (O.). **The inhibitory effect of certain indole compounds upon the growth of Sclerotinia trifoliorum Erikss.**—*Acta agric. scand.*, **9**, 4, pp. 403–411, 4 graphs, 1959.

In previous work at the Inst. Plant Path., Univ. Helsinki, Finland, L-tryptophane in the medium increased the inhibitory effect of *Aerobacter aerogenes* on *S. trifoliorum* [**38**, 701]. In the present study L-tryptophane had no inhibitory effect on the linear growth of the fungus on clover extract agar, though indole, skatole, 3-indolylacetic acid (IAA), 3 indolylpropionic acid (IPA), 3 indolyl-acetonitrile (IAN), and L-tryptamine were inhibitory whether added as liquids to the surface of the medium or incorporated in it. At 0·2–0·4 mg./ml. these compounds completely inhibited growth. Raising the acidity increased the inhibitory effect of IAA, IAN, and IPA, and decreased that of tryptamine. The effects of mixtures of the compounds were additive.

ELLINGBOE (A. H.). **A comparative study of the fungi causing the spring blackstem disease of Alfalfa and Red Clover.**—*Phytopathology*, **49**, 11, pp. 764–770, 5 graphs, 1959. [19 ref.]

A more detailed account of the disease of lucerne and red clover caused by *Phoma herbarum* var. *medicaginis* [**39**, 114] expanding information already noticed [**38**, 213].

ELLINGBOE (A. H.). **Studies on the growth of Phoma herbarum var. medicaginis in culture.**—*Phytopathology*, **49**, 12, pp. 773–776, 1 fig., 4 graphs, 1959.

Further studies at the Inst. Agric., Univ. Minn., St. Paul [see above] showed that 8 isolates from lucerne and red clover differed in growth rate during the 2nd-4th day after germination of single spores, especially in liquid shake culture in Pfeffer's medium. Some cultures continued steady growth from 24 to 72 hr. old, when in others there was a lag phase. Both hosts yielded fast- and slow-growing isolates. In cross inoculation experiments the host from which a spore was isolated did not affect subsequent growth of the spore and the resultant culture. Isolates with different growth rates, cultured in a common medium but separated by cellulose membranes, did not affect each other. Chromatographic analysis indicated these differences to be correlated with carbohydrate metabolism.

Ward (C. H.). **The detached-leaf technique for testing Alfalfa clones for resistance to black stem.**—*Phytopathology*, **49**, 10, pp. 690–696, 1959. [29 ref.]

At Cornell Univ., Ithaca, N.Y., the best inoculum of *Phoma herbarum* var. *medicaginis* [cf. above] for infecting lucerne was obtained from a 21-day-old Petri-dish culture (spores and mycelium) on potato dextrose agar fragmented in 1,000 ml. water and applied with a De Vilbiss atomizer. In the greenhouse inoculations with spore suspension alone were less successful. Tween 20 (1 drop/1,000 ml.) prevented any difficulty in wetting the leaves. Detached leaves [cf. **25**, 269], sprayed with inoculum on a glass plate, were placed in 2% sucrose solution in watch glasses (higher concs. tended to contamination). Leaves survived for 4–5 days, by which time lesions had appeared. Cultures (not fragmented) stored in Petri dishes up to 4 weeks at 3° C. proved reliable sources of inoculum. Satisfactory data were obtainable from leaves kept in the dark. There was no evidence of physiologic specialization among isolates of the pathogen. Field, greenhouse, and detached-leaf tests gave comparable results as regards disease records, and the detached-leaf method is considered as reliable as either of the others.

Zaumeyer (W. J.). **New Tobacco streak virus from symptomless Alfalfa infectious to Beans.**—Abs. in *Phytopathology*, **49**, 9, pp. 555–556, 1959.

The new str. was isolated from symptomless lucerne in southern Idaho in 1958 and produced symptoms on beans [*Phaseolus vulgaris*] and broad beans similar to those caused by the red node and pea strs. on these hosts [**38**, 36, 377], though on Pinto bean necrosis was less severe and mottling more intense than with the red node str. Both symptoms were more severe than those of the pea str., and on some bean vars. the mottle resembled that caused by common bean mosaic virus. The host range is somewhat different from that of the type streak virus and other known strs., though physical properties show relationship to the red node and pea strs.

Diseases of Lucerne.—*Agric. Gaz. N.S.W.*, **70**, 8, pp. 406–412, 9 fig., 1959.

Notes on lucerne diseases in N.S.W., including witches' broom virus [**37**, 133, 673], which may necessitate ploughing in stands as they become unproductive and resowing, and the leaf diseases downy mildew (*Peronospora trifoliorum*), leaf spot (*Pseudopeziza medicaginis*), rust (*Uromyces striatus*) [loc. cit.], and yellow leaf blotch (*P. jonesii*) [cf. **29**, 311], against all of which early cutting or grazing is recommended if they tend to be serious. The most striking of the root and crown rots is caused by a *Phytophthora* sp. [cf. **36**, 307], which may necessitate resowing and crop rotation. A stem blight is often caused by *Colletotrichum trifolii*, and black stem (of little importance) by *Ascochyta* spp. [*A. imperfecta* and *A. pisi*] and *Phoma* spp. Damping-off is induced by *Pythium* spp. and crown wart by *Physoderma alfalfae* [cf. **30**, 125], though this is rare.

Adams (M. W.) & Semeniuk (G.). **The use of population subdivision in effecting a stratification of gene frequencies for reaction in Alfalfa to Pseudopeziza medicaginis.**—*Agron. J.*, **51**, 10, pp. 608–610, 1959.

In further work at S. Dakota agric. Exp. Sta. 36 lucerne plants with the same level of phenotypic resistance to field infection by *P. medicaginis* [cf. **38**, 412] were selected at random from the resistant class of a larger population. Populations from intercrossing within random groups of 3 plants averaged 1·32, on a scale 1–9 for number and type of lesions; these were more resistant than the parental group. Therefore, individual differences were, apparently, still highly heritable, even though no additive genetic variance could be detected among families in the selection generation.

The 12 groups were significantly different among themselves with respect to

mean disease reaction. The basic cause of the group dispersion is believed to be chance, operating when the original selections were assigned to particular groups.

Bushong (J. W.) & Gerdemann (J. W.). **Root rot of Alfalfa caused by Phytophthora cryptogea in Illinois.**—*Plant Dis. Reptr*, **43**, 11, pp. 1178–1183, 2 fig., 1 map, 1959.

This highly destructive root rot of lucerne [**37**, 102] is now reported from Ill. Of 5 isolates of *P. cryptogea* from Ill., 4 were morphologically and pathogenically almost identical with 1 from Calif., but 1 differed morphologically and was only slightly pathogenic.

Kort (J.) & Van Rheenen (H. A.). **Enkele waarnemingen over het optreden van de verwelkingziekte bij Luzerne in Zeeland in 1957.** [Some observations on the occurrence of Lucerne wilt disease in Zeeland in 1957.]—*Tijdschr. PlZiekt.*, **65**, 4, pp. 147–157, 2 pl., 1959. [Engl. summ.]

The disease is severe enough to prevent many farmers from keeping their fields under lucerne for more than 2 yr. running.

In a survey by the Plantenziektenkundige Dienst, Wageningen, no correlation could be found between the degree of attack and soil type, previous cropping history, type of manuring, pH, soil structure, or weed development, though on av. the disease was more severe on lighter soils. From affected lucerne plants in the field *Verticillium alboatrum* [cf. **37**, 497; **38**, 753], *Gliocladium roseum*, and *Fusarium avenaceum* were isolated. On inoculation only *V. alboatrum* and isolates of it from *Capsella bursa-pastoris* and *Plantago major*, and *V. lecanii* from *P. major* caused typical symptoms on lucerne.

As 1st-year crops are seldom attacked the disease would seem to be air- rather than soil-borne [cf. **39**, 86]. Its development is favoured by damage to the crop and particularly by frequent mowing.

Erwin (D. C.), Kennedy (B. W.), & Lehman (W. F.). **Xylem necrosis and root rot of Alfalfa associated with excessive irrigation and high temperatures.**—*Phytopathology*, **49**, 9, pp. 572–578, 2 fig., 1 graph, 1959.

Studies by Univ. Calif. Citrus Exp. Sta., Riverside, showed that lucerne scald [**36**, 248] is due to a combination of flooding and high temp. and not to the high water temp. alone. Four 8 months-old Africa lucerne plants were grown in the greenhouse in sterilized and unsterilized soil flooded at differing temps. and root damage was assessed by the degree of xylem necrosis, affected tissue becoming yellow ochre to dark brown. Plants in unsterilized soil, clipped to 1 in., submerged or not submerged, and left 27 hr. at 39° C. were affected by this temp. only when submerged. Comparable treatment at 24° had no effect on either set. Flooded plants in unsterilized soil developed much more severe root damage than those in sterilized soil. Newly clipped plants were much more sensitive to flooding injury than those clipped earlier. Injury increased with rise in water temp. and lengthening of the submersion period, as was shown in a series flooded and held at 25, 35, and 39° for 6, 12, and 18 hr. Flooding injury in the greenhouse was reduced when the soil was aerated. When max. temps. at 2-in. depth in the field were 33–37°, flooding for 36–60 hr. was necessary to induce injury. Max. air temp. usually exceeded irrigation water temp. by 3–5° and soil temp. at 2 in. by 5–10°. Control entails ensuring efficient drainage to dry out the soil quickly when irrigation, which should leave the soil saturated for as brief a period as possible, is completed.

Klintsare (A. A.). Изменение эффективности симбиоза **Rhizobium meliloti** в зависимости от наличия в почве микроорганизмов, влияющих на их рост. [The change in the effectiveness of *R. meliloti* symbiosis in relation to the

presence of micro-organisms influencing their growth in the soil.]—*Ex* Questions of Agricultural Microbiology III. Труд. Ин-та Микробиол., АН Латв. ССР [*Trud. In-ta Mikrobiol., AN Latv. S.S.R.*], **8**, pp. 87–104, 1959. [28 ref.]

Strs. 13 and 17 of *R. meliloti* [cf. **35**, 593] in pot cultures of Peterlaukskiĭ blue hybrid lucerne grown in medium podzol peat or leached carbonaceous peat at the Latvian agric. Acad. and Inst. Microbiol. were inhibited by *Trichoderma* sp. str. 12 and *Aspergillus* str. 33 and stimulated by *Penicillium* str. 55. The quantity of *R. meliloti* in the soil was slightly decreased in aseptic culture with *Penicillium* str. 30 as an activator. On leached carbonaceous peat soil the quantity of *R. meliloti* was rather less with *Penicillium* str. 30 and *Actinomyces* [*Streptomyces*] str. 63 than with nodule bacteria alone. In pot experiments no increase in lucerne yield was obtained using *Penicillium* str. 30, which did not increase the quantity of *R. meliloti*, though *in vitro* it exerted a positive effect on the growth of nodule bacteria. In field experiments *Penicillium* str. 30 reduced yield by 5% in comparison with *R. meliloti* str. 17. With pure cultures of *Aspergillus* str. 33, *Streptomyces* str. 51, and *Trichoderma* str. 12 the plants yellowed more quickly than the controls and growth was adversely affected. In pot experiments *Penicillium* str. 20 somewhat increased the percentage of N in the lucerne, though it had no positive effect on the quantity of *R. meliloti* or on the lucerne yield.

Current research and investigation.—*Orchard. N.Z.*, **32**, 10, pp. 299–301, 1959.

According to this report of the Plant Diseases Div. and Fruit Res. Div., New Zealand, healthy plum trees yield twice as much fruit as those infected by mosaic [plum line pattern] virus [**38**, 239], even though symptoms may not show on the leaves. The removal of all infected plants was an effective control: of 15,000 lined-out cuttings only 3 exhibited symptoms. No natural infection was observed on the vars. Sultan and Coe's Golden Drop, which also proved immune on inoculation.

While captan is recognized as the most effective fungicide for the control of [apple] bitter rot (*Glomerella* [*cingulata*: **36**, 7]), Bordeaux mixture [**36**, 193] at 2:6:100 gave better results on Sturmer. As captan confers a better fruit finish than Bordeaux, experiments are being conducted for maintaining residues of captan on fruit during rainy periods favourable to bitter rot.

Leaf distortion of flowering cherries, similar to aphis attack, was identified as a virus disease. The virus was detected in root cuttings used as stocks for both flowering and sweet cherries [cf. **38**, 525].

Formation of apothecia of the brown rot fungus [*Sclerotinia fructigena*] was prevented on 2,000 mummied fruits [apricot and peach] buried in soil by Ca $(CN)_2$, even when temp. and humidity were adjusted to favour development. As no apothecia were found in commercial orchards, it is inferred that ascospores are not an important cause of blossom infection.

Kegler (H.). **Untersuchungen über Virosen des Kernobstes. I. Das Apfelmosaikvirus.** [Studies on pome fruit viroses. I. Apple mosaic virus.]—*Phytopath. Z.*, **37**, 2, pp. 170–186, 8 fig., 2 graphs, 1959.

In the German Democratic Republic apple mosaic occurs only sporadically, no particular var. being attacked more than others. Considerable differences in resistance exist within the different apple vars. At the Inst. für Phytopathologie, Aschersleben, the greatest susceptibility was found in Komsomolez, Elisabethapfel, Rebristoje, *Malus lancifolia*, and *M. ioensis*; the lowest, or absence of symptoms, in Weisser Astrachan, Bellefleur Rekord, *M. micromalus*, *M. cerasifera*, *M. fusca*, *M. toringoides*, and *M. robusta*. The virus was transmitted [**37**, 342] by grafting, budding, and pieces of bark, without the graft partners fusing, but mechanical transmission was unsuccessful.

The virus could be inactivated in infected shoots of var. Lady Sudeley in 10 min. by treatment with warm air at 70° C. [cf. **39**, 234]. With warm water treatment the shoot reaches the same temp. as the surrounding water in 1 min. from immersion. With warm air, heating occurs more slowly, so that after 10 min., according to the temp. of treatment, differences of 10–25° can exist between the shoot and the surrounding air. The temp. of inactivation of the virus in the shoot can be determined only by using warm water but successful warm water treatment was not obtained in practice.

Olsson (Karin). **En inventering av gren- och knoppskorv på Äpple.** [A census of branch and bud scab on Apples.]—*Växtskyddsnotiser, Stockh.*, **23**, 1, pp. 5–9, 4 fig., 1959.

In connexion with a study of the ripening of ascospores of apple scab [*Venturia inaequalis*] 54 specimens of branches from different parts of Sweden were examined in 1953 and 16 were found to be infected, 7 of them bearing an av. of 4 or more spots over a length of 10 cm. of the current year's shoot. In an unknown var. (22 specimens) 5% of the leafbuds and 12% of the flower buds were infected. In the majority of the infected buds, mostly collected during April, the scab lesions had already ruptured, exposing mature conidia. In 1958 near Stockholm a number of bud scales were shed in the 'mouse-ear' stage, while considerably more were collected at 'tight-cluster', and others again when the flower buds were beginning to show colour. Thus, the risk of infection from this source may persist for a lengthy period and is enhanced by the susceptibility of the young leaves in the immediate vicinity.

These observations are discussed in relation to those of Salmon [**10**, 737], McKay [**17**, 606], and Cass Smith *et al.* [**27**, 568].

Lembcke (G.). **Zum Problem der Fusikladiumspritzungen unter besonderer Berücksichtigung des Blattfeuchtungsdauerschreibers.** [On the problem of *Fusicladium* spraying, with particular reference to a continuous recorder of leaf moisture.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F. **13**, 7, pp. 127–134, 2 fig., 2 graphs, 1959. [Russ., Engl. summ.]

The author, from the Biologischen Zentralanstalt, Berlin, specifies the data required for the operation of a warning service against apple and pear scab (*Venturia inaequalis* and *V. pirina*, respectively) and describes current methods for obtaining them [cf. below].

Of particular interest is the use of the commercially available Fuess revolving drum thermohygrometer (cf. Schnelle & Breuer, *Ber. dtsch. Wetterdienstes, Offenbach*, **6**, 41, 1958), with the hair replaced by a hemp thread (1–1·5 mm. diam.) exposed openly to the weather in a horizontal position. Rainfall gives a sharp break in the curve, while wetness resulting from dew or mist is recorded less abruptly. The simultaneous graphical records of wetness and temp. are read twice a day, and lend themselves to rapid application of Mill's & Laplante's criteria for fungal infection. In 1958, during the approximate period of ascospore discharge (15 Apr.–15 June) the leaves were wet for 329 out of the total of 1,488 hr., and of these 137 hr. were favourable for infection.

Liebster (G.) & Van Eimern (J.). **Hilfsinstrumente zur Bestimmung der Spritztermine in der Schorfbekämpfung.** [Instruments of use in the determination of spraying dates in scab control.]—*Erwerbsobstbau*, **1**, 4, pp. 70–74, 6 fig., 1959.

Five instruments for measuring rainfall and duration of rain, humidity, and dew, in use at the Inst. für Obstbau, Weihenstephan-Freising, Germany, in connexion with forecasts of apple scab [*Venturia inaequalis*] are described [cf. above].

Cano (F.) & Martelli (R.). **Prove di lotta contro la ticchiolatura del Melo con mericol, fungicida organomercurico.** [Tests of the control of Apple scab with mericol, an organo-mercury fungicide.]—*Notiz. Malatt. Piante* 49–50 (N.S. 28–29), pp. 63–68, 1959. [Engl. summ.]

Spectrophotometric analysis of apple fruits of numerous vars. sprayed against scab [*Venturia inaequalis*] with phenyl mercury naphthenate (mericol) and picked during the 1st 10 days of Sept. showed that if not more than 7 applications were made between the 2nd fortnight in Apr. and the 1st in June the amount of Hg present was always below the limit of tolerance of 0·05 p.p.m. in the skin and core and was virtually negligible (under 0·02 p.p.m.) in the flesh. If 11 or 12 applications were made between the 1st fortnight in Apr. and the 1st 10 days in Aug. the amount of Hg present in the flesh was virtually nil, but that in the skin of certain vars. was above the limit of tolerance [cf. **38**, 89].

Ward (J. R.). **Apple powdery mildew control in Tasmania.**—*Tasm. J. Agric.*, **30**, 3, pp. 198–204, 2 fig., 1959.

Powdery mildew (*Podosphaera leucotricha*) [map 118] has become the major fungus disease of apples in Tasmania. Field tests from 1955–59 showed that colloidal S at 2–2½ lb. or karathane at ½–1 lb./100 gal., +1½ lb. thiram or 2 lb. captan to control ripe spot (*Neofabraea perennans* and *Gloeosporium album*) and black spot (*Venturia inaequalis*) [**36**, 652], gave good control without danger of russet.

Armillaria root rot.—*Tasm. J. Agric.*, **30**, 3, pp. 209–210, 3 fig., 1959.

Armillaria [*mellea*: **28**, 528] is most frequent in Tasmania in apple orchards, is found also on berry fruit, and was recently recorded on hops. Orchards or hop gardens should not be planted for several yr. after thorough clearance of stumps.

Patterson (M. E.). **The relationship of factors affecting Apple scald to the fundamental nature of the disorder.**—*Diss. Abstr.*, **20**, 1, pp. 20–21, 1959.

The incidence of scald [cf. **38**, 703, 755] in apples stored at Purdue Univ., Indiana, in sealed polyethylene crate liners was delayed in 1% O when the CO_2 level was close to that in normal air, and also at O levels near to that in normal air when CO_2 was increased up to 12%. Low O and increased CO_2 acted synergistically. The effect of the liner atmosphere in preventing scald increased with the duration of time during which the fruit were sealed in the liner. Delayed sealing increased scald and caused fruit injury. O and CO_2 levels which reduced metabolic activity delayed the onset of scald. Highly coloured fruits did not scald in storage. Artificial light induced reddening of green fruits in cold storage, if they were treated before the scald induction period was complete.

The prevention of scald by a hot water blanching treatment and a temp. coefficient of 1·8 for the scald reaction were taken as indications of the enzymatic nature of the reaction. Treatment with reducing agents prevented scald after removal from storage.

Polyphenoloxidase activity in the skin was higher in apples which were likely to scald than in those which had scalded. Chlorogenic acid and 2 other unidentified substances, also substrates of polyphenoloxidase, were obtained from apple skin extracts by paper chromatography. They were present in quantity both in fruits which would scald and in those which would not, but had practically disappeared in the scalded. Control achieved by mineral oil is attributed to internal CO_2 and O concs. and not to the absorption of volatile substances from the apples [cf. **38**, 267].

It is concluded that scald substrates, once available to the fruit, are prevented from browning by the presence of reducing agents and by a protective effect which

accompanies the full development of colour. Any treatment which delays the disappearance of reducing substances, promotes colour, or inactivates the browning enzyme, will control scald.

Metlitskiĭ (L. V.) & Tsekhomskaya (Mme V. M.). Биохимическая природа физиологических заболеваний Яблок. [The biochemical nature of physiological diseases of Apples.]—*C.R. Acad. Sci. U.R.S.S.*, **122**, 5, pp. 863–866, 1958.

Much of this information on scald has been noted [**38**, 755].

Otto (G.). **Beitrag zur Frage der funktionellen Bedeutung der Vesikel der endotrophen Mycorrhiza an Sämlingen von Malus communis L.** [On the functional significance of the vesicle of endotrophic mycorrhiza in seedlings of *M. communis*.]—*Arch. Mikrobiol.*, **32**, 4, pp. 373–392, 19 fig., 1959.

At the Institut für Gartenbau Dresden-Pillnitz der Deutschen Akademie der Landwirtschaftswissenschaften, Berlin, mycorrhizal vesicles were studied in longitudinal sections of seedling apple roots [cf. **36**, 597] fixed in potassium bichromate-acetic acid and stained in cotton blue. Their form was largely determined by the surrounding root tissue, and they contained fine or coarse-grained plasma with numerous fat droplets. Their function as reproductive organs was indicated by the formation of the contained protoplasm, and by the occurrence of vesicles rich in nuclei and having cross walls; others contained beaker-shaped spores, and stages in spore development. Further indications of sexual reproduction were seen in the apparent contact with terminally enlarged hyphae lying close alongside.

Following a discussion of the systematic position of the mycorrhizal fungus it is concluded that although there are grounds for placing it in the genus *Endogone* the question remains open.

Braun (H.) & Nienhaus (F.). **Fortgeführte Untersuchungen über die Kragenfäule des Apfels (Phytophthora cactorum).** [Further studies on collar rot of Apple (*P. cactorum*).]—*Phytopath. Z.*, **36**, 2, pp. 169–208, 7 fig., 2 diag., 4 graphs, 1959. [Engl. summ.]

At the Inst. für Pflanzenkrankheiten, Univ. Bonn, Germany [cf. **37**, 667], the germination of oospores [**23**, 184] began only after a dormancy during the winter when the mean soil temp. remained for a long period at about 7·5° C., increasing sharply within 22 days with a mean soil temp. of 13° to 82% (opt. about 16°). The susceptibility of the apple tree is at its greatest during leaf and flower development and the rate of spread of infection through rotted areas in the bark is highest at flowering and when the main shoots are forming. Shoot infections can be induced by spraying with zoospore suspensions on leaves and flowers in different degrees according to the state of development of the tree, temp. and air humidity being decisive factors.

Among 15 vars. in 2 highly infected plantations (13,000 trees) Cox's Orange, Berlepsch, Laxton's Superb, and James Grieve were more or less highly infected in that order. Allington, Weisser Karapfel, and Ontario had occasional infected trees; Boskoop, Red Boskoop, Golden Pearmain, Oldenburg, Zuccalmaglio, Champagner Reinette, Moselgold, and Deutscher Edelapfel (?) were completely healthy. Susceptibility increases clearly with the age. Fruits of 30 apple vars. all bore severe infections after inoculation. In severely infected orchards up to 80% of the fruit had pure *Phytophthora* rots after the June drop. All E. Malling stocks, except IV and IX, became diseased to a greater or lesser degree after inoculation, the bark rot often spreading considerably faster than in the most susceptible scion (Cox's Orange). Extreme vigour in the rootstock favoured fungus spread in both

stock and scion. There are clear indications of biological specialization in *P. cactorum*.

A strong antagonism between soil bacteria and the fungus was demonstrated. Manuring with castor bean meal (12 double centner/ha.) had a very favourable effect, presumably by encouraging the antagonistic organisms. Intermediate grafting provided no reliable protection from infection.

McIntosh (D. L.). **Collar rot of Pear trees in British Columbia.**—*Phytopathology*, **49**, 12, pp. 795–797, 1 fig., 1959.

At Kelowna, B.C., 5- to 6-yr.-old d'Anjou and Bartlett pear trees were found in 1957 infected by *Phytophthora cactorum* [cf. **33**, 609 and above], which caused necrosis and death of the bark from just below ground level to a height of 10–12 in. Even complete girdling of the trunk may not affect tree vigour or fruit size in the season of infection, though subsequently losses may occur if the affected area of the trunk is not treated. In inoculation experiments 3–4-yr.-old trees proved more resistant than 5–6-yr.-old bearing trees. A resistant rootstock may prove necessary. [Similar information also appears in *Plant Dis. Reptr*, **44**, 4, pp. 262–264, 2 fig., 1960.]

Moreau (Mireille). **L'Aspergillus mangini : Ses exigences nutritives, ses conditions de développement.** [*A. mangini*: its nutritional requirements and conditions for development.]—*Fruits d'outre mer*, **14**, 8, pp. 315–328, 5 fig., 1 graph, 1959.

Studies at the Laboratoire de Cryptogamie, Muséum national d'Histoire naturelle, Paris, on *A. mangini* [cf. **25**, 142], agent of prune mould, showed it to utilize large quantities of sugars, in particular saccharose, but less glucose. The commercial prune (R.H. 30-35%) with its high ratio of sugar to water constitutes an ideal medium for the fungus. The 3 main causes for mould development, the R.H. of the fruit and atmosphere and the storage temp., are all difficult to regulate or change without spoiling the quality of the fruit. At 10° [C.] the exchange of water between the prunes and the atmosphere is greatly reduced, which checked disease development, a rapid spread of which occurred at 20 and 25°. Most chemical treatments are impracticable and autoclaving destroys the flavour. A low storage temp. and controlled R.H. are recommended.

Kuznetsov (L. V.). Влияние света на спорообразование гриба **Clasterosporium carpophilum Ad.** возбудителя болезни «дырчатая пятнистость» плодовых косточковых культур. [The effect of light on the sporulation of the fungus *Clasterosporium carpophilum*, the causal agent of 'shot hole' disease of stone fruit crops.]—Науч. Докл. высш. Школ. [*Nauch. Dokl. vŷssh. Shkol.*], Biol. Sci., *1958*, 3, pp. 110–112, 4 fig., 1958.

In experiments in spring 1957 at Moscow Univ., plates of wort agar were sown (3 repetitions) with a culture of *C. carpophilum* [cf. **37**, 544] and held at 25° C. under different conditions of light. Triple irradiation with ultra-violet light for 2 min. every 2 days during alternating light and darkness induced copious sporulation, which was less with constant artificial light, and still further reduced in continuous darkness. Hardly any spores were formed in alternating light and dark. These results suggest that the fungus reacts to unfavourable conditions by copious sporulation as a defence reaction. Germination in an irradiated culture was by the production of spores developed in 48–50 hr., and not germ tubes; these spores germinated within 18–22 hr. by normal germ tubes to give a downy mycelium. Some spores from irradiated cultures failed to germinate, others soon died. Inoculation of branches and leaves of cherry, plum, and *Prunus padus* showed that for spores from irradiated cultures the incubation period was increased by 48–50 hr., i.e. the time taken for spores to germinate.

Ashour (W. E.) & Allam (M. E.). **Cultural studies on Clasterosporium carpophilum which causes shot-hole disease of stone fruits in Egypt.**—*A'in Shams sci. Bull. 1958*, 3, pp. 45–55, 2 fig., 1959.

At the Fac. Agric., Saraya el Kobba, Cairo, the opt. temp. for growth of *C. carpophilum* (isolated from peach) [**38**, 17] on corn meal agar was 25–30° C., at R.H. 90–100%. Tabulated data show that growth and sporulation were opt. in normal Richards's medium and that the C/N ratio was clearly important to growth.

Giussani-Cosolo (A.). **Prove con ziram contro le malattie crittogamiche del Pesco.** [Tests with ziram against fungal diseases of Peach.]—*Notiz. Malatt. Piante*, 49–50 (N.S. 28–29), pp. 165–166, 1959. [Engl. summ.]

Morettini no.1 5 yr.-old peach trees, sprayed on 4 Dec. 1957 and on 16 Jan. 1958 with ziram 0·6 or 0·8%, and given a pre-floral application on 25 Mar. (at 1%) combined with white oil and parathion, developed virtually no infection by *Taphrina* [*deformans*: **37**, 17] or *Coryneum* [*Clasterosporium carpophilum*: **36**, 539], though those unsprayed or sprayed with 3% Bordeaux mixture became infected. These latter were given 3 applications of ziram 0·25% in spring and summer, with satisfactory results and no phytotoxicity.

Grosclaude (C.) & Simone (J.). **Essais de quelques fongicides organocupriques dans la lutte contre la cloque du Pêcher.** [Trials of several organic copper fungicides for the control of Peach leaf curl.]—*Phytiatrie-Phytopharm.*, **8**, 2, pp. 103–107, 1959.

In further trials at the Sta. de Pathologie Végétale du Sud Ouest (I.N.R.A.), Pont-de-la-Maye, Gironde, France [cf. **37**, 292], on the control of *Taphrina deformans*, a mixture of ziram (15%) with Cu (basic copper sulphate, 33%) applied at 0·5% 'of the commercial product' was only slightly inferior to Bordeaux mixture [cf. above]. Two zineb-Cu mixtures were inadequate.

Tsakadze (T. A.). К вопросу об окислительно-восстановительных реакциях в гуммозных тканях Косточковых. [Concerning the oxidizing-reducing reactions in gummosed tissues of stone fruit trees.] *Soobshch. Akad. Nauk Gruz. S.S.R.*, **21**, 2, pp. 195–200, 1958.

This paper from the Inst. for Plant Protection, Tiflis, reports the results of experiments made at the Bot. Inst. Georgian S.S.R., with apricot and peach in natural conditions and inoculated peach, which suggest that *Cytospora* [*Valsa*] *leucostoma* [**39**, 118] and *Coryneum* sp. disrupt the oxidizing-reducing processes, with all the resultant pathological phenomena.

Wishart (R. L.). **Apricot gummosis.**—*J. Agric. S. Austr.*, **63**, 3, pp. 110–119, 23 fig., 1959.

This is a popular summary of observations hitherto made in various districts of S. Australia on this continually increasing disease caused by *Eutypa* [*armeniacae*: cf. **37**, 93]. Emphasis is laid on prophylactic control measures, including destruction of infected wood [cf. **35**, 376] and disinfection of saw cuts and pruning tools. A modified pruning system is recommended, which consists in cutting only the shoots at a considerable distance from the main limbs, since the wounds may act as channels to infection. This technique does not reduce fruit size or quality.

Barksdale (T. H.). **Green ring mottle virus as an entity distinct from the Sour Cherry ring spot and yellows viruses.**—*Phytopathology*, **49**, 12, pp. 777–784, 1959. [19 ref.]

Studies were undertaken at Cornell Univ., Ithaca, N.Y., to clarify the relationship

of the increasingly important cherry green ring mottle virus of Montmorency sour cherry to sour cherry [peach] ring spot virus [**34**, 654; **38**, 706], with which it is generally associated, and to cherry (sour) yellows virus [**39**, 181] of which it has been considered a str. [**37**, 488, 727]. Symptoms on Montmorency are green rings on yellowed leaves, which eventually drop, a 'constricting chlorosis' along the major veins, and bitterness of the fruit with patches of necrotic tissue in the flesh and surface irregularities. During a 7 yr. survey of an affected orchard, spread of green ring mottle was slow and continuous, and unrelated to that of ring spot and yellows. The virus was graft transmissible to Montmorency and Kwanzan cherry both in the presence and absence of ring spot. Summer inoculation of [*Prunus serratula* var.] Shirofugen with ring spot caused local gumming and necrosis round the bud insertion; green ring mottle had no such effect, but on Kwanzan (autumn inoculation) it caused severe veinal necrosis and downwards twisting of the leaves, compared with a sparse, mild chlorotic mottle induced by the other 2 viruses. English Morello cherry proved a symptomless host of green ring mottle and did not develop the pointed, late maturing fruit as previously suggested (*Phytopathology*, **43**, p. 481, 1953).

Green ring mottle was shown to exist in multiple infections in Montmorency with one or more other stone fruit viruses, no interference being observed between them. Green ring mottle develops best on shaded shoots and at high temp. (70–75° F.), whereas yellows develops both in shade and sunlight and particularly when a long cool period follows petal fall. The green ring mottle virus is therefore considered to be distinct from the other two.

Fulton (R. W.). **Purification of Sour Cherry necrotic ringspot and Prune dwarf viruses.**—*Virology*, **9**, 4, pp. 522–535, 5 fig., 1 graph, 1959.

Purified preparations of virus G (cherry necrotic ring spot virus) [cf. **36**, 599; **38**, 154] and virus B (prune dwarf virus) [cf. **39**, 181] made at the Plant Pathology Dept. Univ. Wis., contained round particles of approx. 23 mμ and 22 mμ diam., respectively. They were more stable in 0·02 M phosphate buffer than in crude extracts. Purified necrotic ring spot virus lost infectivity rather rapidly in distilled water and was quickly inactivated by shaking.

Schuch (K.). **Das Ring- und Bandmosaik der Süßkirsche.** [Ring and band mosaic of the Sweet Cherry.]—*Z. PflKrankh.*, **66**, 7, pp. 395–401, 4 fig., 1959. [Engl. summ.]

In inoculation experiments at the Institut für Obstkrankheiten, Heidelberg, Germany, material from an infected seedling of *Prunus avium*, the symptoms on which have already been described [**36**, 703], produced foliage symptoms on F 12/1 [**38**, 268] and on seedlings of *Prunus mahaleb* and peach. *P. cerasifera myrobalana* developed distinctive single or zoned bands of a sort not previously seen by the author in this indicator. When *P. serrulata* var. Shirofugen was grafted with buds of F 12/1 infected by ring and band mosaic none of the grafts took, and there was browning of the cambial zone in the stock, accompanied in 6 out of 12 instances by slight gumming. When the same stock was grafted with buds of Fromms Herzkirsche infected by cherry tatter leaf [peach ring spot] virus none took, there was moderate to severe necrosis of the stock bark at the grafting site, and strong gum flow in every case: with F 12/1 infected by Pfeffinger disease [cherry rasp leaf virus: see below] the reaction was similar except that the bark necrosis was always severe. In F 12/1 stocks inoculated with ring and band mosaic growth was considerably reduced, the height 26 months after grafting being only 77·1% that of controls.

It is concluded that the disease is closely related to the ring mottle seen in England [**36**, 198].

Evenhuis (H. H.), Mulder (D.) & Pfaeltzer (H. J.). **De overdracht van de rozetziekte, een virusziekte van de Kers.** [The transmission of rosette disease, a virus disease of Cherry.]—*Tijdschr. PlZiekt.*, **65**, 4, pp. 122–127, 2 pl., 1959. [Engl. summ.]

In the Netherlands the rosette disease of cherry (Eckelrade or Pfeffinger [cherry rasp leaf virus: **38**, 530]) is found in the provinces of Limburg, Noordbrabant, and Zeeland. At the Institut voor Plantenziektenkundig Onderzoek, Wageningen, the disease was not transmitted by 25 insect spp. (listed) or by sap inoculation, but soil transmission was strongly indicated in a preliminary experiment in which 20 F 12/1 stocks planted in 1956 in soil from an infected orchard in Limburg all developed primary symptoms in 1958. Again, in 1957, some sweet cherry seedlings planted in contaminated soil under cheesecloth cages developed primary symptoms in the following year, and 2 developed secondary symptoms (enations).

Robbs (C. F.). **Uma doença bacteriana da Piminteira do reino (P. nigrum), nova o Brasil.** [A bacterial disease of Black Pepper, new to Brazil.] *Rev. Agric., Piracicaba*, **34**, 4, pp. 263–266, 1959.

Foliar bacteriosis (*Pseudomonas syringae*) of black pepper is reported for the 1st time from the Escola Nacional de Agron., Rio de Janeiro, Brazil. The 1st visible symptoms are small dark green spots, particularly on the lower surface of the leaves. In rainy periods the lesions grow rapidly, becoming round or angular and surrounded by a yellow halo. Finally they turn brown or dark ash-colour and dry. When the spots are numerous they tend to coalesce, forming large necrotic areas, and causing premature leaf fall. The stems are rarely attacked. *P. syringae* was isolated from black pepper and successfully transmitted to lemon and *Phaseolus vulgaris* by prick inoculation.

Joshi (L. M.) & Reddy (A. R.). **Some observations on Uromyces indigoferae Diet. & Holw., the rust of Indigofera linifolia Retz.**—*Indian Phytopath.*, **12**, 1, pp. 25–28, 1959.

Investigations of the life cycle, host range, and physiological specialization of *U. indigoferae* [**38**, 676] from collections of *I. linifolia* from Delhi, Bhopal, and Sangar showed that the uredospores germinate readily within less than 3½ hr. at 8–35° C. (opt. 18–25°) and they are mainly responsible for perpetuating the disease. The teleutospores (cardinal germination temps. 18–20°, 15°, and 35–37°), which do not require a dormant period, can survive the summer and may help to perpetuate the rust, possibly by means of an alternate host. The rust from *I. linifolia* cannot infect *I. tinctoria* and vice versa and the f. spp. *linifoliae* and *tinctoriae* are therefore proposed.

Siddiqui (M. R.) & Prasada (R.). **Heterothallism in Puccinia carthami (Hutz.) Corda, the rust of Safflower.**—*Indian Phytopath.*, **12**, 1, pp. 59–68, 4 pl., 17 fig., 1959.

In laboratory and greenhouse studies at the Indian agric. Inst., New Delhi, it was shown that this rust (*P. carthami*) [**29**, 534] is heterothallic. Uredinoid aecia formed from mixed sporidial infections and a regular binucleate condition in the primordia of uredinoid aecia and their spores, as in the normal aeciospores, was noted. It is suggested that this rust can no longer be considered brachyform or microcyclic.

Thomas (C. A.). **Effect of storage time and temperature on control of seed-borne Safflower rust by volatile mercury fungicides and the efficacy of certain seed protectants and antibiotics.**—*Plant Dis. Reptr*, **43**, 12, pp. 1250–1252, 1959.

Tests by the Crop Res. Div., U.S. Dept Agric., proved the general utility of volatile Hg compounds, including panogen 15, ceresan 75, and ceresan M, against *Puccinia*

carthami [**31**, 459; cf. **38**, 94, 219], and showed that these fungicides ensured better control at higher dosages if the storage period was extended and the storage temp. raised. Treatment with panogen 15 at 2 oz. bush. at 25° C. for 0, 1, 3, 7, and 30 days resulted in, respectively, 0·8, 0·5, 0·3, 0·1, and 0·07% affected seedlings. Storage of seed for 2 months or longer prevented seedling infection entirely, whereas all the control seedlings were attacked. Ceresan 75 and ceresan M gave similar results.

Stone (W. J.). **Sesame blight caused by Helminthosporium sesami.** *Phytopathology*, **49**, 12, pp. 815–817, 1959.

In further studies at College Sta., Texas [cf. **36**, 61], heavy infection of plants 7–21 days old, sprayed with a culture suspension, was obtained after 60–72 hr. at 100% R.H. and about 30° C. Older plants were more tolerant of infection, which was max. with 7-day-old cultures of the pathogen, decreasing with older cultures. N alone or with Ca, each added to the soil (an infertile sand) at 40 lb./acre, caused the greatest increase in infection; the level was also high with Ca alone or no fertilizer. K and P alone, and the latter with Ca, reduced infection. Of 267 sesame lines screened, only 14 showed any degree of tolerance of the disease under greenhouse conditions.

Pietkiewicz (T. A.). **Z badań nad chorobami roślin oleistych.** [From studies on diseases of oleaginous plants.] *Roczn. Nauk rol.*, **78** (Ser. A), 2, pp. 199–218, 3 graphs, 1958. [Russ., Engl. summ.]

At the Instytut Ochrony Roślin, Reguły, Poland, in 1953–56, *Alternaria* spp. were isolated from 76·4% of the infected seeds of *Lallemantia iberica*; *A. porri* and *A. tenuis*, causing dry leaf and stem spot, were destructive during germination. *Botrytis cinerea* and *Fusarium* sp. were the most frequent isolates from seeds of *Perilla ocymoides*; *B. cinerea*, *F.* spp., *A. tenuis*, *Rhizopus nigricans* [*R. stolonifer*], *Thamnidium elegans*, *Trichothecium roseum*, *Penicillium glaucum*, *Mucor* spp., and bacteria were associated with seeds of *Ricinus communis*. *Puccinia carthami* was the most important pathogen of *Carthamus tinctorius*. The seed-borne *Peronospora arborescens* was found in all the important opium poppy-growing regions, causing extensive damage on moist sites; it also occurred on wild *Papaver* spp.

Zarzycka (Hanna). **Mikoflora nasion Maku.** [Fungus flora of Opium Poppy seeds.] *Roczn. Nauk rol.*, **78** (Ser. A), 2, pp. 309–342, 12 fig., 2 graphs, 4 maps, 1958. [Russ., Engl. summ.]

At the Instytut Ochrony Roślin 500 seed samples from various parts of Poland [cf. above] were examined by sowing on wort agar, on filter paper in germinators, and in pots of soil in the greenhouse. Among the fungi identified, *Pleospora calvescens*, *Fusarium scirpi* var. *caudatum*, and *Alternaria* spp. attacked seeds and seedlings in pathogenicity tests. Surface disinfection of seeds showed that only a few bore such pathogens internally. *P. calvescens* can cause serious reduction in germination and seedling decay.

Czyżewska (Sabina). **Badania fitopatologiczno-mykologiczne nasion Rzepaku (Brassica napus L. var. oleifera DC.).** [Phytopathological and mycological studies on seeds of Rape (*B. napus* var. *oleifera*).] *Roczn. Nauk rol.*, **78** (Ser. A), 2, pp. 283–307, 7 maps, 1958. [Russ., Engl. summ.]

At the Instytut Ochrony Roślin about 500 seed samples were examined for microorganisms by sowing on agar, filter-paper, and in soil [as above]; 17·11% proved healthy. *Phoma lingam* and *Sclerotinia sclerotiorum* were not detected. All the fungi and some of the bacteria occurred superficially, internal infection being limited to a few bacteria. *Alternaria brassicae*, which causes the most severe disease of the crop in Poland, was isolated from only 0·2% of seeds bearing *A.* spp. *A. brassicae* and *Botrytis cinerea* were found on living tissue of the siliqua during the growing period.

Loof (B.). **Ekonomiskt viktiga sjukdomar på korsblomstriga oljeväxter och möjligheterna till deras bekämpning speciellt genom resistensförädling.** [Economically important diseases of cruciferous oil crops and possibilities for their control, especially by breeding for resistance.]—*Sverig. Utsädesfören. Tidskr.*, **69**, 4–5, pp. 237–250, 4 fig., 1959. [Engl. summ. 23 ref.]

Alternaria spp., including *A. brassicae* and *A. circinans* [*A. brassicicola*], are the principal pathogens in Europe, causing substantial yield reductions in moist, warm regions of the W., and the prospects of effective chemical control are considered to be doubtful. Heavy infection by *Botrytis cinerea*, occurring under the same conditions, is thought to be secondary to attacks by *A.* spp., *Stemphylium*, and rape weevil.

Infection by *Plasmodiophora brassicae* is sporadic but frequently destructive. It is well known to be largely controllable by breeding and many resistant vars. are available. In experiments at Svalöf, white and Sarepta mustard sustained the heaviest damage among the summer crops.

Peronospora brassicae [*P. parasitica*] is prevalent in Sweden but generally mild, though blighting of the cotyledons of winter rape, which occurred in Scania during 1949–52, may impede further development. The pathogen is favoured by low light intensity. It comprises a number of physiologic races, and differences in varietal reaction were observed at Svalöf in 1951 and 1958.

Sclerotinia sclerotiorum and other *S.* spp. and *Typhula* spp., principally *T. borealis*, are important mainly in the N. [cf. **39**, 136], where the snow cover persists for long periods.

The damage caused by *Albugo candida*, *Erysiphe communis*, *Xanthomonas campestris*, and viruses is normally inconsiderable.

McDonald (W. C.). **Gray leaf spot of Rape in Manitoba.**—*Canad. J. Pl. Sci.*, **39**, 4, pp. 409–416, 2 pl. (11 fig.,) 1959.

At the Canada Dept Agric., Winnipeg, Man., *Alternaria brassicae* [cf. **38**, 233] was isolated from black spots on stems and pods, from grey to black spots on the leaves, and from seeds of rape. The disease, 1st reported in 1955, caused considerable damage in the wet years 1955 and 1956. Max. sporulation was obtained on 10% lucerne seed decoction agar. The fungus was pathogenic to seedlings and mature plants, and penetrated the leaves via stomata. Inoculation in the greenhouse and field resulted in shrunken seeds and seed infestation and lowered the yield and percentage germination.

Menon (K. P. V.) & Pandalai (K. M.). **The Coconut palm.** xvi+384 pp., 138 fig. (21 col.), 10 graphs (1 col.), 2 maps, Ernakulam, S. India, Indian Central Coconut Committee, 1958. 85*s*. [Received Feb. 1960.]

This exhaustive and very well presented monograph, covering every aspect of the botany, cultivation, and utilization of the crop, includes chapters on diseases, soil conditions in relation to health and disease, abnormalities, and a final useful summing up of present-day problems in coconut research, indicating the main fields in which further knowledge is required, including several in which international co-operation is desirable. Each chapt. has a comprehensive bibliography.

Diseases, references to which are fully summarized, are dealt with as they affect the bud, leaf, fruit, and stem, with further descriptions of the various wilts and diseases of unknown origin, and those possibly due to viruses. In another chapt. the literature concerning the relation of the soil to certain of these diseases is extensively covered. The whole should prove invaluable to anyone concerned with the pathology of the coconut palm.

Pandalai (K. M.), Sankarasubramoney (H.), & Menon (K. P. V.). **Studies on soil conditions in relation to the 'root' and 'leaf' disease of the Coconut Palm**

in Travancore-Cochin. Part VI. The combined water, hygroscopic water, loss on ignition and water-table aspects of Coconut soils. Part VII. The mechanical composition of Coconut soils of healthy and diseased areas.—*Indian Cocon. J.*, **12**, 3–4, pp. 87–100; 101–113, 1959.

In further studies at the Central Coconut Res. Stas., Kasaragod and Kayangulam [**39**, 184], soil samples from healthy coconut plantations in sandy, red loam, and laterite areas contained a higher percentage of combined water than samples from diseased plantations on the same soils, while the reverse obtained with alluvial loams. A higher percentage of hygroscopic moisture was also characteristic of the 'healthy' red loam and laterite areas. As many areas where the disease is present have high water tables, waterlogging is considered to be an important predisposing factor.

No significant mechanical differences could be found between 'healthy' and 'diseased' soils. Emphasis is placed on the need for a free-working soil and good drainage.

Velasco (J. R.), Holaso (A.), De La Peña (R. S.), Pantastico (E.), & Guevara (V. F.). **Aluminium and its possible relationship to the cadang-cadang of Coconut.**—*Philipp. Agric.*, **43**, 2–3, pp. 177–199, 13 fig., 1959.

Further studies [cf. **37**, 549] indicated that the Al cation at even 2·5 p.p.m. was toxic to certain plant spp. and as available Al at 0·043–0·052% was detected in soils where the disease occurred, compared with 0·015% in soil where it was absent, the authors suggest that Al toxicity might be the cause of the disease; adverse effects on the water economy cause the progressive diminution of the crown of leaves. The severe premature fall of nuts and ultimate inhibition of the fruit bunches may be due in part to low levels of Cu [loc. cit.].

Arenz (B.) & Hunnius (W.). **Der Einfluß der Frührodung auf Ertrag, Sortierung und die Virusausbreitung bei Vorkeimsorten.** [The influence of early lifting on yield, grading, and virus spread in pre-germinated varieties.]—*Prakt. Bl. PflBau.*, **54**, 1, pp. 1–11, 1959.

At the Landessaatanstalt, Weihenstephan, Bavaria, the av. overall decrease in yield of potatoes due to early lifting during 1956–58 was 32%. This varied with var. according to maturity date (Erstling 26%, Ob. Frühe 42%). The proportion of 'seed' size (3·4–7 cm.) was higher with early lifting in 2 yr. and with normal lifting in 1; over the 3 yr. it amounted to 70 and 71% of the crop in the 2 harvests. Among the virus diseases [cf. **38**, 763], leaf roll and potato virus Y were controlled most effectively by early lifting, the relationship of early : late lifting in terms of infection being 1 : 2·99 and 1 : 2·87, respectively. Potato crinkle mosaic and mild mosaic [? strs. of virus Y: loc. cit.] increased strongly in 1957 and 1958, but only in Erstling, Doré, and Sirtema. Early lifting produced only a slight effect (1 : 1·33 and 1 : 1·18, respectively).

Roland (G.) & Tahon (J.). **La transmission du virus de l'enroulement de la Pomme de Terre (Solanum virus 14) par les pucerons.** [The transmission of Potato leaf roll virus (*Solanum* virus 14) by aphids.] –*Rev. Agric., Brux.*, **12**, 7–8, pp. 661–670, 1959.

The results are presented of 3 yrs.' investigations at the Lab. de Phytovirologie, Gembloux, Belgium, to determine the opt. conditions for the transmission of potato leaf roll virus by *Myzus persicae* [cf. **36**, 51; **37**, 109, *et passim*]. *Datura stramonium*, *D. tatula*, *Physalis angulata*, *P. floridana*, and certain potato vars. were satisfactory sources of the virus. Detached potato leaves on wet sand can be used; leaves from field plants gave better results than those from the greenhouse, the age of the plants or the leaves having no effect.

The best indicator plant and the least sensitive to variations in the experimental conditions was *D. tatula*. Of the potato vars. studied, Industrie was the best, developing virtually no latent leaf roll. For positive transmission, an acquisition feeding of 48 hr. on *D. tatula* and an inoculation feeding of 48 hr. on Industrie were necessary, 3–5 days' acquisition and 2–3 days' inoculation being opt. With potato sprouts as source 2 days' acquisition were insufficient, though transmission occurred after periods of 10 and 20 days. A prior period of starvation was unnecessary if the acquisition feeding was reasonably long.

The best results were obtained when the feeding was carried out at 24° C. and high R.H. with 5–10 aphids/plant. The development of severe symptoms was favoured by a temp. not over 15°, high light intensity, not too high R.H. (copious watering twice a week only), wide spacing between the plants, and frequent moving of the pots to increase the rigidity of the stems.

Duncan (J.), Généreux (H.), & Couture (G. R.). **La dissémination dans le champ de la mosaïque et de l'enroulement des feuilles par les pucerons de la Pomme de Terre.** [The spread in the field of mosaic and leaf roll by Potato aphids.]—*Ann. Soc. ent. Québec*, **2**, pp. 53–59, 1956. [Received 1960.]

The importance of infected plants in the spread of potato leaf roll virus [**28**, 301] and [? rugose] mosaic [virus Y: **3**, 548] was studied under field conditions at the Lab. du Service des Sciences, Saint-Anne-de-la-Pocatière, Quebec. During 5 seasons, plants growing round a centre of infection were infected more frequently than those further away. The dominant winds seem to play an important part in this. In plots lying in a SW.-NE. direction, with dominant winds from the SW., the number of infected plants on 15 Sept. to the NE. of the centre of infection was 53 compared with 34 to the SW. Before 15 Aug. there was practically no infection, but afterwards it increased until the end of the season. No correlation was found between the different aphid spp. (*Macrosiphum solanifolii*, *Myzus persicae*, and *Aphis abbreviata*) or their populations with the spread of these virus diseases.

Hamann (U.) & Goerlitz (H.). **Die Beeinflussung des Ertrages der Kartoffelsorten Ackersegen, Bona, Frühbote und Erstling durch das Rippenbräunevirus.** [The influence of vein-browning virus on the yield of the Potato vars. Ackersegen, Bona, Frühbote and Erstling.] *Nachrbl. dtsch. PflSchDienst, Berl.*, N.F., **13**, 6, pp. 115–119, 1959. [Russ., Engl. summ.]

Since summer 1956 a new potato virus Y str. [**38**, 485], identified at the Institut für Pflanzenzüchtung Groß-Lüsewitz der Deutschen Akademie der Landwirtschaftswissenschaften, Berlin, and thought to be close to or identical with the Al str. of Köhler [**34**, 668] or the vein necrosis virus of Klinkowski and Schmelzer [**39**, 238, 242], has been present in potatoes in E. Germany, in particular in the above-mentioned vars. The intensity of symptom expression on Bona and Ackersegen varies from plant to plant, ranging from latent infection through light to severe mosaic, and the growth habit is loose. On Erstling and Frühbote the symptoms (of fairly severe mosaic) are relatively uniform. Streaks appear on the underside of the leaves from mid-July, though often not until early Aug., and sometimes without any symptom on the upper surface. Although symptoms are relatively mild and late, 100% infection can cause 34–68% losses in yield. In trials with Ackersegen and Bona the losses were mainly attributable to a reduction in the number of tubers, amounting in the former to 40% with an infection level of 60–80%. On the basis of these findings veinal necrosis is to be officially classified as a 'severe' virus disease of planting material.

Leont'eva (Mme Y. A.). Высокоурожайный и устойчивый к вирусным болезням клон Картофеля сорта Ранняя Роза. [A high yielding Potato clone, var.

Rannyaya Roza, resistant to virus diseases.]—Науч. Докл. высш. Школ. [*Nauch. Dokl. vÿssh. Shkol.*], Biol. Sci., *1959*, 3, pp. 139–144, 2 graphs, 1959.

By selection from the var. Rannyaya Roza of plants resistant to rugose mosaic virus [potato virus Y ? –X] since 1945, a single clone (No. 17) was obtained in 1950 which had a healthy haulm and gave the highest yield. In 1951 No. 17 gave especially healthy robust plants. Tubers were free from rots in store whereas 8·2–14·7% of Rannyaya Roza were attacked. In the following years selection from No. 17 sown in spring and summer was continued. For 3 yr. it was free from virus diseases in the Rostov-on-Don region, though in other regions up to 17·3% virus infection developed. From 1954–58 the av. yield of No. 17 was 208·5 centners/ha. and that of Rannyaya Roza 81·4 c., virus infection (rugose mosaic, stripe mosaic, gothic [spindle tuber: cf. below], and [tomato] stolbur) being 15·7 and 96·6%, respectively.

Bershtein (B. I.), Fomyuk (M. K.), & Okanenko (A. S.). Влияние вырождения типа готики на содержание аминокислот в клубнях Картофеля. [The effect of the 'gothic' type of degeneration (spindle tuber) on the amino acid content of Potato tubers.] *C. R. Acad. Sci. U.R.S.S.*, **120**, 2, pp. 425–428, 1 fig., 1958.

Chromatographic analyses of var. Malÿshek at the Ukrainian sci. Res. Inst. Plant Physiol. disclosed changes in the amino acid and amide content of the sap of tubers infected by spindle tuber [cf. **37**, 502]: α-amino butyric acid appeared and glutamine and asparagine increased, while cystine and glutamic and aspartic acids decreased.

Wenzl (H.). **Zikadenübertragbare Virus-krankheiten von Kulturpflanzen.** [Leaf hopper transmitted virus diseases of cultivated plants.] *Pflanzenarzt*, **12**, 7, pp. 76–77, 3 fig., 1959.

After reference to Valenta's important work on [tomato] stolbur and other virus diseases of potato in Czechoslovakia [cf. **38**, 135, 680, *et passim*] the author gives a popular account of stolbur as seen in Austria [**39**, 185].

Sommereyns (G.). **Des méthodes de transmission et d'identification du virus A de la Pomme de Terre.** [On the methods of transmitting and identifying Potato virus A.]—*Rev. Agric., Brux.*, **12**, 7–8, pp. 651–659, 1959.

At the Lab. de Phytovirologie, Gembloux, Belgium, potato virus A [cf. **36**, 420; **38**, 485] is mechanically transmitted to tobacco, *Nicandra physaloides*, and *Solanum demissum* in order to find a good plant-source of the virus, to estimate virus conc., or to prepare antigen, and by grafting to test for varietal resistance in potato. Identification is effected by inoculating detached leaves of *S. demissum* var. S or EBS 99 or serologically with anti-A serum. These methods demonstrated that of 4 lines of *S. demissum* studied none was predominantly susceptible. The number of local lesions appearing on leaves of *S. demissum* was greater than on *N. physaloides*, but the latter was a good source of virus. Virus conc. attained a max. in tobacco 27 days after inoculation and after 18 days in *N. physaloides*.

Gigante (R.). **Il virus della necrosi del Tabacco in tuberi di Patata.** [Tobacco necrosis virus in Potato tubers.]—*Boll. Staz. Pat. veg., Roma*, Ser. 3, **16** (*1958*), 2, pp. 131–146, 12 fig., 1959. [Engl. summ. 22 ref.]

Sieglinde potato tubers developed brown spots with reticular cracks in the skin. Tubers derived from these appeared to be normal, but contained a virus which was identified as tobacco necrosis virus. The virus was present in small amounts in the leaves, petioles, and stalk of the potato plants and in large amounts in the roots; in the tubers it was confined to the affected parts.

Sembdner (G.). **Die Bakterien- und Pilzkrankheiten der Kartoffel.** [Bacterial and fungus infections of the Potato.]—96 pp., 32 fig., Wittenberg-Lutherstadt, A. Ziemsen Verlag, 1959. DM 4.50. [16 ref.]

This well-produced booklet is intended to provide the non-specialist with concise descriptions of such diseases occurring in Germany. A key is provided for their determination by symptoms visible to the naked eye and there is an index to Latin names.

Dembskaya (Miss L.). Устойчивость Картофеля к заболеваниям. [Resistance in the Potato to diseases.]—Сел.-Хоз. Сибири [*Sel.-Khoz. Sibiri*], *1959*, 11, pp. 63–64, 1959.

A phytopathological evaluation of potato vars. at the Novosibirsk agric. Exp. Sta., U.S.S.R., in 1954–58, showed that the seedlings 45–10 and 46–69 were entirely resistant to *Phytophthora* [*infestans*: **38**, 619], while 19 vars. of 55 tested appeared resistant to macrosporiosis [*Alternaria solani*]. As a rule, both diseases showed predilection for tubers rather than stems and leaves. Susceptibility to rhizoctoniosis resulting in black scurf [*Corticium solani*: **38**, 620] varied considerably from year to year according to environmental factors. Black leg [*Erwinia* spp.] affected over 15% of Sedov and Épron on an average, but under 1% Lorkh and Berlikhingen. Berlikhingen was also little susceptible to black scurf and macrosporiosis.

Sazonik (Kh. V.). Осеннее обеззараживание почвы против рака Картофеля. [Autumn soil disinfection against Potato wart.]—Защ. Раст., Москва [*Zashch. Rast., Moskva*], **4**, 5, p. 49, 1959.

At the All-Union Sta. for Potato Wart, Chernovtsȳ, in order to determine the effectiveness of autumn soil disinfection with chloropicrin against *Synchytrium endobioticum* the soil (temp. at 10 cm. 5° C. and 55% humidity) from which a 60–72% infected crop had been harvested was treated on 11 Nov. 1957 with chloropicrin [cf. **38**, 418] (2·5, 3, and 4 t/ha.) to a depth of 12–14 cm. using a manual injector. Half of each plot was mulched with tar paper left on during the winter and removed in spring as soon as the snow melted; on 18 May susceptible potatoes were planted on this part of the plots. On 25 Aug. there was no infection in the treated sections compared with 41–74% elsewhere.

Førsund (E.) & Flaatten (H. K.). **The interrelationship between climate and outbreak of late blight epiphytotics. The late blight incidence predicted by means of long range weather forecasts.**—*Meld. Norg. LandbrHøjsk.*, **38**, 6, 61 pp., 5 diag., 37 maps, 1959. [Norw. summ.]

A more detailed account from the agric. Coll. Norway of information already noticed [**38**, 27].

Guntz (M.). **Epidémiologie du mildiou de la Pomme de Terre. Éléments de prévision.** [The epidemiology of Potato blight. The bases of forecasting.]—*Phytiatrie-Phytopharm.*, **8**, 2, pp. 55–63, 3 graphs, 1959.

This is a general account, from the Station de Pathologie Végétale, I.N.R.A., Versailles, of the use of meteorological data in forecasting the zero date [cf. **32**, 586; **39**, 188] for outbreaks of potato blight [*Phytophthora infestans*]. Sporangial traps may be set up to provide additional evidence of the occurrence of the cycles before the zero date: there are usually 3–5 of them [cf. Bourke, **37**, 553]. In France the cycles proceed more slowly in the regions influenced by the Atlantic, but the time taken for completion of 3 cycles is generally shorter than in the regions with a continental climate, because the process is less often interrupted by unfavourable periods, but 1958 was exceptional in that there were frequent showers in continental

areas. This, combined with the higher temp. obtaining, led to the appearance of the disease earlier there than in the Atlantic areas.

Hiebel (K.). **Erfahrungen mit der praktischen Auswertung der Phytophthora-Testparzellen im Landkreis Bad Kissingen von 1955 bis 1958.** [Experience in the practical evaluation of *Phytophthora* test plots in the Bad Kissingen area, 1955–58.]—*Pflanzenschutz*, **11**, 8, pp. 119–121, 1959.

In these experiments by the Landwirtschaftsamt Bad Kissingen, the timing of spraying of potato crops was based on observations of the 1st occurrence of *P. infestans* in observation plots of Bona, Erstling, and Ackersegen on sites particularly exposed to the disease. Results were entirely satisfactory, while meteorological data (temp., rainfall, and humidity) for the 14 days preceding the 1st infections were so varied that they could not be reduced to a single denominator [**39**, 188].

It is concluded that, even where the disease occurs early and in strength, 2 sprayings at appropriate times suffice for control. When it appears very late one application is enough. Early vars. should be sprayed as soon as possible after the appearance of infection on the 1st early to mid-early vars. in the observation plots. With late vars. an interval of 5 days after the 1st lesions are observed on Bona is permissible.

Malmus (N.). **Wirtschaftliche Krautfäulebekämpfung durch gezielte Spritzungen.** [Economic control of blight by well timed spraying.] —*Prakt. Bl. PflBau*, **54**, 2, pp. 49–53, 1959.

A popular note explaining how the correct times for spraying against *Phytophthora infestans* are determined by observation of potato test plots [cf. above].

Kerssen (Miss M. C.). **Experiences with aerial spraying against Potato late blight in the Netherlands.**—*Agric. Aviation*, **1**, pp. 35–38, 3 fig., 1959.

For reasons of economy the max. amount of spray liquid applied by aeroplane for the control of *Phytophthora infestans* on potato is 45 l./ha., using 7–10 kg./ha. Cu oxychloride or 3–5 kg. zineb. Most trials have been with Piper Super Cubs [**34**, 162], which are provided with 24–27 nozzles having D6 and D8 orifices and cores 25 and 45, producing 30–45 l./ha. compared with 120–800 l. from ground equipment. Of the various Cu preparations tested, the colloidal pastes gave disappointing results, while with a $\frac{2}{3}$ normal rate of Cu oxychloride there was an increase in tuber rot. The initial difficulties encountered in the application of zineb were overcome by more thorough mixing and the use of an improved product. After 6 yr. of practical experience the potato area sprayed by aircraft is still being increased and during the last 3 yr. some 40% of all air treatments were for blight control.

Toxopeus (H. J.). **Notes on the inheritance of field resistance of the foliage of Solanum tuberosum to Phytophthora infestans.**—*Euphytica*, **8**, 2, pp. 117–124, 1959. [Dutch summ.]

In the very wet summer of 1956 observations were made at the Inst. agric. Plant Breeding, Wageningen, on damage caused by *P. infestans* on the foliage of about 2,000 small seedling clones of 35 cross-combinations, in some of which the genes R_1 and R_3 for hypersensitivity were involved. Field resistance in material lacking these genes seemed to be governed by a series of minor genes of which the dominance relationships were obscure. There were no lesions on material containing R genes during the initial stages of the epidemic, but with the rapid build-up physiologic races developed, and ultimately this material also was more or less heavily attacked. It seems that the field resistance of R-clones to new biotypes is governed by a set of minor genes probably identical with those in material lacking R genes.

In the R material, as with the common vars., there is a close relationship between earliness and low field resistance [**37**, 735]. The possible value of the genes for field resistance which may be present in wild Mexican spp., notably *S. demissum*, is discussed.

Kedar (N.), Rotem (J.), & Wahl (I.). **Physiologic specialization of Phytophthora infestans in Israel.** — *Phytopathology*, **49**, 10, pp. 675-679, 1 map, 1959.

In Israel a spring crop of potatoes, mostly Up to Date and Arran Banner, largely from 'seed' from Scotland and N. Ireland, is the source of 'seed' for the next autumn crop; both are severely damaged by *P. infestans* [**31**, 361]. Of the isolates of the pathogen identified on potato differentials at the Hebrew Univ. Jerusalem, Rehovot, race 4 [cf. **34**, 610] was the most prevalent, increasing from 68% in 1955 to 100% in 1957. Race 0 [cf. **36**, 661], 24% in 1955, was not found at all in 1957. Races 1,3, 1,4, and 1,3,4 were found occasionally. There was no correlation between the distribution of the races and the climate of the regions in which they occurred.

Classification of the potato isolates on tomato differential hosts indicated the common occurrence (36%) of race T_{00} [cf. **34**, 554; **35**, 245], a potato race invenous on tomatoes. 28% T_0 virulent only on recessive vars. (including the commonly grown Marmande), 16% T_1 pathogenic on Rutgers and accession W.Va 106 but avirulent on W.Va 36-1 and W.Va 700, 16% T_{00}, similar but parasitic on W.Va 36-1, and 4% able to attack all 4 vars.

Sokolova (Mme V. E.), Savel'eva (Mme O. N.), & Rubin (B. A.). Химизм превращения хлорогеновой кислоты в клубнях картофеля, пораженных **Phytophthora infestans.** [The nature of the changes of chlorogenic acid in Potato tubers infected with *P. infestans*.] — *C. R. Acad. Sci. U.R.S.S.*, **123**, 2, pp. 335-338, 1 fig., 1958.

Though extracts from tubers of resistant (Moskovskii) and susceptible (Rannyaya Roza) [**39**, 337] vars. all contained chlorogenic acid [cf. **37**, 210] spectrophotometric analysis showed that in infected tissue of the former it was slightly over 40% of that in the healthy parts, while for the latter var. the difference between the two was 4½ times. The necrotic barriers in the resistant var. contain much less chlorogenic acid than infected tissue of the susceptible. Penetration by the fungus clearly brings about a movement of chlorogenic acid towards the site of infection. Polymers and condensed compounds, formed probably from quinic acid, induce the strong activation of polyphenoloxidase in the infected resistant var. Caffeic acid, found in extracts from necrotic tissue, seems to be a residuum not used in the condensation process.

Tomiyama (K.), Takahashi (M.), Takase (N.), & Sakai (R.). **Alteration of oxidative metabolism in a Potato tuber cell invaded by Phytophthora infestans and in the neighbouring tissues.** — *Phytopath. Z.*, **37**, 2, pp. 113-144, 1 fig., 17 graphs, 1959. [Germ. summ., 42 ref.]

In further studies at the Hokkaido Nat. agric. Exp. Sta., Sapporo, Japan [**37**, 504, 754], it was found that in an initial period of infection of Irish Cobbler and Hokkai No. 10 tubers respiration was more stimulated in cells invaded by an incompatible race (race 1 or race 0) of *P. infestans* than in those invaded by a compatible race. Later, at the onset of degeneration, respiration became CO and cyanide-resistant in both susceptible and resistant cells. The respiratory stimulation in superficial cell layers of the cut surface of tuber caused by the act of cutting seems to be controlled by a monomolecular autocatalytic reaction. Theory indicated that the ratio of the O uptake of a cell somewhat distant from the cut surface to that of the next cell is essentially constant at a given time after cutting. Ascorbic acid oxidase

may play a role as a terminal oxidase in the stimulated respiration caused by the cutting and the CO and cyanide-sensitive enzyme system, which seems to have a high affinity for O, may play the role of terminal oxidase. Cytochrome oxidase was also found to be stimulated in inner tissues.

The respiratory change in resistant tuber tissue inoculated on the cut surface with a dense zoospore suspension seemed to be the same, in some respects, as that in response to cutting. An incompatible race, however, has a more severe and deeper effect than that of cutting. No significant difference was found in respiratory changes between the tissue invaded by a compatible race and uninfected tissues, at least in the relatively early stages. The efficiency of the Pasteur effect, which was unaffected until a later stage (start of degeneration), in resistant tissue may be related to a defence reaction and not to a symbiotic relationship.

Sarai (R.). **Physiological studies on Phytophthora infestans (Mont). de Bary. Part 12. Factors affecting sporulation in artificial culture.** *Ann. phytopath. Soc. Japan*, **24**, 3, pp. 154–160, 7 graphs, 1959. [Jap. Abs. from Engl. summ.]

In further studies [**37**, 745 and above] the most profuse production of sporangia of isolates H_1 and H_2 of *P. infestans*, from Irish Cobbler and Kennebec, respectively, was obtained on bean meal agar (50 g. dry beans (*Phaseolus vulgaris*), 10 g. sucrose, 10 g. agar/l.). As the addition of bean meal extract to potato dextrose agar did not increase sporulation, it is assumed that no specific substance is necessary to promote it. Addition of alanine to PDA containing 1% sucrose caused little change in mycelial growth, but increased sporulation greatly; no such increase occurred after adding alanine to bean meal agar. The balance between N and sugars in the medium was the most important factor in sporulation, the opt. C : N ratio in semi-synthetic media being 7:1. In the experiments described the opt. concns. of C and N sources in the basal medium were about 1% sucrose and 0·2% L-arginine monohydrochloride.

Rotem (J.). **The influence of sandstorms in the Negev on the sensitivity of Potatoes and Tomatoes to the early blight disease.** *Bull. Res. Coun. Israel*, **7D**, 2, pp. 100–102, 2 fig., 1959.

The extraordinary virulence of early blight (*Alternaria solani*) in the arid and semi-desert areas, particularly in the NW. Negev, is due to sandstorms, the grains injure the plant tissues and make them liable to increased infection, especially if sandstorms are followed by rain, fog or dew. The presence of otherwise invisible injuries was indicated by a red colouring of leaves immersed for 12–24 hr. in 0·1% 2–3–5 triphenyl tetrazolium chloride.

Campacci (C. A.). **Contrôle da 'queima das folhas' da Batatinha.** [Control of 'leaf scorch' of the Potato.]—*Biológico*, **25**, 10, pp. 212–214, 1 fig., 1959.

On the basis of comparative experiments in the Presidente Prudente region of São Paulo, Brazil, where potatoes are planted almost exclusively in the dry season, 0·2% dithane M-22 is recommended for the control of *Alternaria solani* [**39**, 122], which is very destructive locally. Bravtan at 0·15% also gave good results. The 5 or 6 treatments were applied 1st at 7- and later at 11-day intervals, beginning when the plants reached a height of 15–20 cm.

Krassz (J.). **Einfluß der Vortemperatur auf die Pathogenität einiger Pilze und ihr Wachstum in vitro.** [Influence of the pre-temperature on the pathogenicity of some fungi and their growth *in vitro*.] —*Phytopath. Z.*, **37**, 2, pp. 159–163, 1959. [Engl. summ.]

In further work at the Inst. für Pflanzenkrankheiten, Univ. Bonn [**39**, 241], during Nov. and Dec. pathogenicity of *Fusarium coeruleum* to Sieglinde potato tubers was slightly, and that of *Botrytis cinerea* markedly, increased by pre-temps. [**39**, 190]

of 24° C. and 3°, respectively. *B. cinerea* usually remained non-pathogenic after pre-temps. of 15° and 24°. None of these pre-temps. affected the pathogenicity of *Alternaria solani* [loc. cit.]. Alterations in pathogenicity of *B. cinerea* are apparently caused only by limited exposure to 3°. No significant influence of pre-temp. on vegetative growth *in vitro* of the fungi could be proved, nor was there any correlation between vegetative growth and pathogenicity.

Menzies (J. D.). **Occurrence and transfer of a biological factor in soil that suppresses Potato scab.**—*Phytopathology*, **49**, 10, pp. 648–652, 8 fig., 1959.

At the Irrigation Exp. Sta., Prosser, Wash., soil from certain fields, farmed under irrigation for over 50 yr., in which potato scab (*Streptomyces scabies*) is very rare, suppressed the disease in pot experiments with White Rose potatoes. The 1st yr. crop, from infected seed pieces, was slightly scabbed, but in 4 further successive crops infection decreased to a trace, whereas it rose to a high level in virgin soils. Likewise, scab was controlled when heavily infested soil from other sources was mixed in equal quantity with the 'suppressing' soil, but not if the latter had been steamed. Good control in infested soil was also obtained with an admixture of only 1% 'suppressing' soil+1% lucerne meal, though neither was consistently effective alone. A biological factor, possibly microbial, would appear to be responsible.

Deslandes (J. A.). **Sarna pulverulenta de Batata (Spongospora subterranea).** [Powdery scab of Potato (*S. subterranea*).]—*Circ. Inst. agron. Rio Grande do Sul* 7, 16 pp., 1956. [Received Oct. 1959.]

The inability of this pathogen to establish itself in Brazil has already been noticed [**35**, 539; map 34].

Haussdörfer (M.) & Müller (W. A.). **Zum Auftreten der Phoma-Stengelbräune an Kartoffeln im Sommer 1957.** [On the occurrence of *Phoma* stem browning on Potatoes in summer 1957.]

Müller (W. A.). **Die Verbreitung von Phoma solanicola im Gebiet der Deutschen Demokratischen Republik.** [The distribution of *P. solanicola* in the German Democratic Republic.]—*Nachrbl. dtsch. PflSchDienst, Berl.*, N.F., **13**, 6, pp. 112–115, 5 fig.; 7, pp. 121–122, 1 map, 1959. [Russ., Engl. summ.]

In 1957 *P. solanicola* [cf. **38**, 333; **39**, 241] caused serious losses in several regions of E. Germany. Early symptoms were punctate necrosis of the stems and petioles of plants otherwise apparently healthy. Later, in severely affected plants, these parts were covered by confluent necrotic patches and the plants died back. Vars. differed widely in susceptibility, Ackersegen dying back altogether, while neighbouring crops of Johanna, Leona, Merkur, and particularly Capella developed only the initial symptoms. Infection tests at the Institut für Pflanzenzüchtung, Gross-Lüsewitz, confirmed that *P. solanicola* was the pathogen, though naturally infected plants frequently bore fructifications of *Alternaria*, *Colletotrichum*, and *Fusarium*. Opt. pH for development of the fungus in culture was 5–9, though at 2 and 12 some growth was possible. Opt. temp. was 20° C., min. < 5°, max. 25–30°. A survey in late Aug.-Sept., 1958, when 196 samples of dead stems from 12 districts were examined for pycnidia, indicated that the disease is widespread and affects most vars.

Salerno (M.). **Sclerotinia sclerotiorum (Lib.) de By. e Sclerotinia minor Jagger, nuovi nemici della Patata precoce in Sicilia.** [*S. sclerotiorum* and *S. minor*, new enemies of early Potato in Sicily.]—*Notiz. Malatt. Piante* 49–50 (N.S. 28–29), pp. 137–141, 2 pl., 1959.

In 1958 and 1959 early potatoes growing near the E. coast of Sicily were severely infected by *S. sclerotiorum* in association with *S. minor*. The latter does not appear

to have been recorded before in Italy on potato. The damage caused was directly related to the earliness of its appearance, affected plants dying before the tubers had ripened.

Khrobrykh (N. D.). Оospopoз на сортах и видах Картофеля. [Oosporosis in Potato varieties and species.]—*Bull. appl. Bot. Pl.-Breed.*, **33**, 1, pp. 231–241, 1958. [Abs. in *Referat. Zh. Biol., 1959*, 21, pp. 196–197, 1959.]

Oospora pustulans [**39**, 189] has been found on many potato vars. in the Murmansk and Leningrad regions, and on fewer in Latvia and Estonia. Isolated outbreaks have been noted in the Omsk, Semipalatinsk, and other regions. In the Leningrad area the most susceptible vars. include Imandra, Arran Pilot, Gol'den, and Comet; Stakhanovskii, Fridolin, and the hybrid *Solanum andigenum*×*S. tuberosum* 1/122 are not infected. Heavy infection occurred on the wild spp. *S. gibberulosum* and *S. dolichostigma* but none on *S. sucrense*, *S. jamesii*, and *S. ballssii*. Infection is most severe on sandy-podzol soil and under short-day conditions. Prophylactic measures are recommended for control. The effectiveness of autumn hardening in the light and covering tubers in bins with peat containing granosan is suggested.

Kendrick (J. B.), Wedding (R. T.), & Paulus (A. O.). **A temperature-relative humidity index for predicting the occurrence of bacterial soft rot of Irish Potatoes.**—*Phytopathology*, **49**, 11, pp. 701–705, 2 graphs, 1959.

At Univ. Calif. Citrus Exp. Sta., Riverside, 100 lb. lots of White Rose potatoes, washed and scrubbed for market, were kept at 50, 68, or 78° F., either wet in wet sacks or dry in dry sacks, temp. and R.H. being recorded at intervals for 26 hr. when the tubers were examined for bacterial lenticel infection by *Erwinia carotovora* [**26**, 352; **38**, 621]. It was possible to calculate a temp.-R.H. index

$$(X) = \frac{2{\cdot}5\ (\%\text{R.H. hrs. above } 90\%) + (^{\circ}\text{hrs. above } 40^{\circ}\text{ F.})}{100}$$

which had a significant positive correlation with the incidence of the disease, enabling prediction of its occurrence. It would need modification for other potato vars., tubers that were immature, damaged [**33**, 558], or had been exposed to sunlight [**24**, 115], or for thermophilic strs. of the pathogen. In potatoes stored at 100% R.H. and 47, 64, or 68° disease increased with temp.; at 40°, even at this humidity, soft rot should not develop during the first 26 hr. At 60–70° a R.H. of 90% or less is more favourable to suberization and wound periderm formation than to soft rot development.

Dubey (H. D.). **Relation between nitrogen, phosphorus, and potassium fertilization and incidence of stem rot disease of Sweet Potato.** *Sci. & Cult.*, **25**, 2, pp. 139–140, 1959.

In 1955 a heavy attack of *Fusarium oxysporum* f. [*F. bulbigenum* var.] *batatas* [cf. **37**, 506] on unirrigated experimental fertilizer plots of a local red var. of sweet potato at the Deochanda Exp. Sta., Hazaribagh, Bihar, India, caused total crop failure. Tabulated data indicate that the percentage mortality was directly related to N and P applications (av. percentage mortality 65·41 with no N, 74·34–80·02 at 20 lb. N/acre, and 80·84–83·92 at 60 lb.), though there was no relation to interaction between the 3 fertilizers (N, P, and K).

Riggenbach (A.). **Report of the Plant Pathology Department.**—*Rep. Rubb. Res. Inst. Ceylon, 1958*, pp. 49–55, 1959.

In an experiment on the control of rubber mildew (*Oidium heveae*) [cf. **38**, 98] 30 acres of clones Tjir 1 planted in 1938 were dusted at 7-day intervals with ordinary dusting S at 6 lb./acre for the 1st 4 rounds and 10 lb. for the next 3. Leaves shed in

5 ft. × 5 ft. plots in the area dusted by the ordinary Mistral II AB duster were 50,081, compared with 14,820 for the same brand with the Agenda air-conducting device [cf. **39**, 214], a promising initial showing for the electroduster.

Cu-based dusts were again the best fungicides against leaf disease (*Phytophthora palmivora*). The organo-metallic products, maneb-zinc (containing 4% Zn) and zineb (2% Zn) gave adequate control, while thiram-zinc dust (4% thiram) gave good results, all at 10 lb. per acre. Electrostatic dusting with a special makers' dust was no better than ordinary dusting.

Against bark rot (*P. palmivora*) ammonium [39 lb.] is now widely used on commercial estates. The waterproof dressing Shell TB 102 and its active fungicidal ingredient were both ineffective. Against pest disease (*Fomes lignosus*) Cu-ox liquid continued to give excellent results.

PERRIS (O. S.). **Studies on the production of toxins by Fomes lignosus. I. Preliminary investigations.** *Quart. J. (formerly Trop. Nat.) Nat. Res. Inst. Ceylon*, **35**, 2, pp. 38–40, 2 pl., 1959.

An isolate of *F. lignosus*, highly pathogenic to rubber [cf. **38**, 801], was grown in liquid culture in flasks manufactured by Higginbotham's method [**36**, 717; **38**, 125]. When placed in culture filtrates up to 90 hr. old, cuttings of tomato seedlings developed a gradual curling of the leaves followed by the formation of necrotic spots. The older leaves were affected before the younger. No wilting occurred at any stage. The toxin was thermostable when maintained at 100° C. for 10 min. The older the culture from which the filtrate was obtained (up to 44 days), the more rapidly did the necrotic symptoms develop on tomato cuttings dipped in it.

EDGERTON (C. W.). **Sugarcane and its diseases.** 301 pp., 56 figs., 1 graph. Baton Rouge, Louisiana State University Press, 1958. $7.50. [714 ref.]

A 2nd revised, and somewhat larger edition [cf. **36**, 2].

Reports of the Division of Entomology and Pathology. Disease investigations.—*Rep. Bur. Sug. Exp. Stas Qd* 59, pp. 68–90, 18 figs., 1959.

H. W. MONTGOMERY reports (pp. 68–72) that no progress was made in checking the spread of chlorotic streak [virus cf. **39**, 144], the most serious threat to sugarcane in Queensland, but the measures taken against sugarcane mosaic [virus cf. **34**, 651] in the Mackay district have reduced its incidence. Leaf scald (*Xanthomonas albilineans*) continued in wetter areas.

According to the report (pp. 82–90) by C. G. HUGHES [cf. **38**, 271], vars. N. 19 and particularly N. 48 (H. 32-8 × H. 50-3611), have a promising degree of resistance to scald; inoculated seedlings of Pindar commercially resistant developed leaf streaks. Ratoon stunting [virus] may be present in the stalk as well as in the sets, the former being equally effective and not inferior in respect of germination. Examination of 750 chlorotic streaks showed a tendency for these to occur on groups of leaves rather than on single leaves, some streaks increase in length with time, others may disappear or develop for the first time on mature leaves. Bacterial wilt (*Erwinia stewartii* var. *dissolvens*) spread in some new localities, but not alarmingly. It may apparently remain latent for some time.

The symptoms of mosaic in Q. 50 were more apparent on upper portions of the stalk than on the leaves. No pure-line Ivory millet (*Sclerospora sorghi*) [**37**, 306], to which N. 45, N. 202, N. 230, and N. 265 are resistant, occurred in the Bundaberg area. Hot-air treatment [54° C. for 10 hr.] proved ineffective against 21 minor diseases [cf. **38**, 276].

Mosaic disease and N:CO.339.—*S. Afr. Sug. J.*, **43**, 11, p. 977, 1959.

N Co 339 is the most susceptible var. in Natal to sugarcane mosaic virus [**36**, 727].

the LD_{50} being about 85 p.p.m. and the LD_{95} 120 p.p.m. for the spores of a local str. of *B.*; the LD_{50} for pollen germination was 12,000 p.p.m. and the conc. used in the field, 1 lb./6 gal. of water (16,630 p.p.m.), was inhibitory to pollen *in vitro*.

Analysis of the influence of botrilex [cf. **36**, 702] on soil microflora showed a marked effect on actinomycetes (*Streptomyces* spp.) but its action is specific fungistasis, rather than unspecifically fungicidal. It is not satisfactory against *Fomes lamaensis* and *Ustulina zonata* root rots.

Visser (T.), Shanmuganathan (N.), & Mulder (D.). **The possibility of timing blister blight spraying according to sunshine records.** *Tea Quart.*, **30**, 1, pp. 39–43, 1959.

A new method of timing blister blight [*Exobasidium vexans*] spraying, based on the principle that a certain amount of sunlight day will kill the majority of potentially infectious spores [**37**, 738], was tested for the 1st time in Ceylon. During periods with adequate sunshine the degree of infection is expected to remain at approx. 30–35% shoot infestation; therefore spraying is necessary only during periods with insufficient sunshine. An experiment for 8 months, with 46 assessments of blister blight incidence, indicated that such a system, based on the principle that spraying is discontinued following a 5-day period during which sunshine exceeds $3\frac{3}{4}$ hr. daily and resumed when sunshine drops below this level, provided adequate protection, at the same time reducing the number of spray rounds by about 40% over the experimental period. Certain practical difficulties for field application are noted, but the method is promising.

Mulder (D.) & Shanmuganathan (N.). **Oilspot of Tea leaves—a new disease?**—*Tea Quart.*, **30**, 1, pp. 44–45, 1 pl., 1959.

This hitherto unknown condition has been noticed during the last 2–3 yr. on Ceylon tea estates at 5,000 and 7,000 ft. Numerous small spots, initially translucent, appear on the underside of the leaves; they later become dark grey in the centre and finally dark brown, varying in shape and size and in severe cases coalescing to colour the whole undersurface brown. Sometimes there are excrescences, giving the appearance of scab [cf. Petch, [**3**, 3], p. 43], but this develops only on the older leaves, whereas oilspot occurs on young very tender leaves and causes severe defoliation and dieback.

On 'high jat' seedlings symptoms are more acute with bigger spots than on 'low jat' seedlings, but though development is slower on the latter defoliation is more complete. Symptoms return on diseased branches after pruning. Roots of diseased bushes have no abnormality. A fungus [unspecified] was isolated from the spots but appears to be merely saprophytic. As the oilspots develop only in areas with very high humidity and low temp. it is possible that the condition may be due to a lack of balance between water uptake and transpiration.

Zaitlin (M.). **Isolation of Tobacco leaf cells capable of supporting virus multiplication.** *Nature, Lond.*, **184**, 4691, (Suppl. 13), pp. 1002–1003, 2 fig., 1959.

In this technique, described from the Dept. Hort., Univ. Mo., Columbia, fully expanded leaves of Turkish Samsun tobacco cut into 3 mm. strips were vigorously shaken for 3–4 hr. in a 0·1 M Sörensen's phosphate buffer (pH 6·2) containing 0·35 moles sucrose and 0·2% pectinase I. Cells become detached from the cut surfaces of the leaf pieces and when the shaking is finished they sink. When the supernatant has been twice poured off and twice replaced by buffered sucrose the preparation is purified by repeated centrifugation and resuspension until a clear supernatant is obtained. From their microscopic appearance a high proportion of the isolated cells are viable, and they support the multiplication of tobacco mosaic virus when incubated. When infected cells were incubated in the presence of radioactive

amino-acid (glycine 1-C^{14} or DL-leucine 1-C^{14}) the amino-acid was incorporated into the protein of the virus. The method also gave good yields of viable cells from *Nicotiana glutinosa*, *Datura stramonium*, and potato, but in preparations from peach, cherry, and *Magnolia* sp. the cells appeared to be injured.

Replication of Tobacco mosaic virus. *Nature, Lond.*, **184**, 4704, pp. 1992–2001, 1 fig., 4 graphs, 1959. [15 ref.]

At Washington Univ., St. Louis, Mo., B. Commoner, J. A. Lippincott, & Janey Symington made estimations of the virus content of White Burley tobacco leaves inoculated with the standard Johnson str. of tobacco mosaic virus and then treated with labelled CO_2. Results showed that the virus is synthesized *de novo*, the max. time for the formation of 1 particle (rod) being 5 min. Virus protein and ribonucleic acid are synthesized from their respective precursors concurrently at approx. equal rates, both by a process of linear extension near one end of the rod at least.

An article (pp. 1998–2001) by B. Commoner contains a discussion of theoretical structure and replication in the light of experimental findings.

Matsui (C.). **Fine structure of X-body.** *Virology*, **9**, 3, pp. 306–313, 6 fig., 1959.

At the Lab. Plant Path., Univ. Nagoya, Anjo, Japan, X-bodies in leaf cells of Xanthi tobacco inoculated with the common str. of tobacco mosaic virus [cf. **37**, 184], examined under the electron microscope, were usually dense granular or vacuolated granular structures without definite membranes. Some of them consisted of a peripheral zone, either granular or a membranous organelle associated with the granules, and an internal matrix.

Woody (B. R.) & Knight (C. A.). **Peptide maps obtained with tryptic digests of the proteins of some strains of Tobacco mosaic virus.** *Virology*, **9**, 3, pp. 359–374, 2 fig., 1 graph, 1959.

At the Univ. Calif., Berkeley, soluble peptides separated from the common, M, J 14 D 1, YA, and HR strs. of tobacco mosaic virus [**27**, 162; **39**, 42] exhibited many features in common and some striking differences. The common strain and M were identical; J 14 D 1 and YA differed from them in a number of minor spots on chromatograms; whereas HR was quite different from the others.

Takahashi (W. N.). **The role of an anomalous noninfectious protein in virus synthesis.** *Virology*, **9**, 3, pp. 437–445, 1 fig., 1 graph, 1959.

In further studies at the Dept Plant Path., Univ. Calif., Berkeley [cf. **38**, 336], tobacco mosaic virus with the high infectivity of the native virus was reconstituted *in vitro* by the combination of an anomalous non-infectious protein (X) isolated from diseased plants (cf. Van Rysselberge & Jeener, *Biochem. Biophys. Acta*, **23**, pp. 18–23, 1957) with nucleic acid isolated from tobacco mosaic virus. It is suggested that in the host the reduplication of nucleic acid and the formation of X occur separately and simultaneously, the 2 components subsequently polymerizing to constitute the characteristic infectious rods.

Mundry (K. W.). **The effect of nitrous acid on Tobacco mosaic virus : mutation, not selection.**—*Virology*, **9**, 4, pp. 722–726, 2 graphs, 1959.

In answer to Bawden's criticism [**39**, 124] of an earlier paper, the author summarizes his reasons for reasserting that the phenomenon in question is due to mutation.

Bobŷr (A. D.). Вплив деяких амінокислот на вірус Тютюнової мозаїки. [The effect of some amino acids on Tobacco mosaic virus.] *J. Microbiol., Kiev*, **21**, 4, pp. 25–30, 1959. [Russ. summ.]

Experiments at the Inst. Microbiol., Acad. Sci. Ukr. S.S.R., demonstrated that

asparagine, aspartic acid, and glutamic acid significantly inhibit the activity of tobacco mosaic virus *in vitro*. They are also active *in vivo* in isolated leaves of *Nicotiana glutinosa*. This activity, however, was evident only when tested leaves were treated at the moment of infection. Other amino acids listed also strongly inhibited tobacco mosaic virus in isolated leaves of Havanna tobacco. Inactivation of the virus, brought about by these substances in comparatively low concs., when titered on very young leaves of *N. glutinosa*, is reversible. Inhibition increases, and reversibility decreases, as the conc. is raised and the duration of the action increased.

Ulrychová-Zelinková (Marie). **Cadmium ions as inhibitors of Tobacco-mosaic virus.**—*Biol. Plant. Acad. Sci. Bohemoslov.*, **1**, pp. 135–141, 1959. [Engl. *Chem. Abstr.*, **53**, 22, col. 22273 e, 1959.]

When the leaves of young potted tobacco plants were watered with a total of 160 mg. $CdSO_4$ immediately before and 3 days after inoculation, 70% inhibition of mosaic virus resulted, the effect being apparent in a reduced loss of starch and diminished development of chlorotic lesions. The potency of the solution was considerably impaired by application 24 hr. before inoculation. On leaves treated with 320 mg. spots were formed resembling the necroses developing on *Nicotiana glutinosa* infected by the virus. It appears from preliminary determinations that inorganic P in the foliage is increased by small, and reduced by large, doses of Cd.

Shimomura (T.) & Hirai (T.). **Studies on the chemotherapy for plant virus diseases. IV. Effect of the antibiotics on the multiplication of Tobacco mosaic virus.**—*Ann. phytopath. Soc. Japan*, **24**, 2, pp. 93–96, 1959. [Jap. Abs. from Engl. summ.]

In further studies at Nagoya Univ. [cf. **38**, 163] disks cut from tobacco leaves inoculated the previous day with tobacco mosaic virus (TMV) were floated on solutions of a number of antibiotics in Petri dishes continuously illuminated at 25° C. After 4 days the disks were assessed for the amount of TMV synthesized, using Bancroft and Curtis's method [**36**, 428], and the results are tabulated. Of 30 antibiotics tested, 8 induced 20% or more inhibition of virus multiplication under the experimental conditions.

Gol'din (M. I.) & Vostrova (Mme N. G.). Новый штамм из группы вируса мозаики Табака, дающий внутриядерные включения. [A new strain in the Tobacco mosaic virus group producing intranuclear inclusions.]—*C. R. Acad. Sci. U.R.S.S.*, **128**, 1, pp. 183–185, 1 pl., 1 fig., 1959.

This str., the Kazakhstan str., was detected in 1957 at the Inst. Microbiol., Acad. Sci. U.S.S.R. It differs from the IC str. [**28**, 250] in the symptoms induced and in other characters. On inoculation of tobacco leaves round, bright green and yellow-orange spots appeared 7–10 days later (1–5 spots per leaf), subsequently also on uninoculated leaves. During the next 5–10 days they enlarged to form a ring, frequently with a necrotic centre. Slight marbling and paling of the veins occurred in many leaves. This str. is inactivated after 10 min. at 80° [C.]. The inclusions also differ. The nucleus may become surrounded by a thick ring with a diam. 2–3 times that of the normal nucleus, formed of a threadlike virus inclusion which is an extension of the intranuclear inclusion and has some of the nuclear substance. It has pronounced blunt ends, while the protoplasmic inclusions have thin, sharp ends.

Bruyns-Haylett (J. P.). **Prevent mosaic in seedbeds and lands.**—*Fmg in S. Afr.*, **35**, 7, pp. 24–25, 2 fig., 1959.

The following measures are recommended from the Central Tobacco Res. Sta., Rustenburg, for the prevention of mosaic virus disease [**35**, 163] on tobacco: per-

manent seedbeds must not be near any place where tobacco is handled, and must be steam-sterilized at 96° C. to a depth of 6 in. for 1 hr.; manufactured tobacco products which have not been flue-cured must be strictly forbidden near the seedbeds; labourers must wash their hands and arms effectively before handling seedlings or containers or before planting in the field; if a seedling becomes infected the healthy seedlings near it and others in contact with it must be removed first and then the infected seedling; cheese cloth used for covering seedbeds should be steeped in boiling water for 10 min.; the entire seedbed site must be kept clear of weeds and all superfluous seedlings removed; temporary seedbeds should be made on ground on which no tobacco has been cultivated for at least 2 yr. All mosaic infected plants must be destroyed if the percentage of infection does not exceed 1%.

Labaw (L. W.). **An electron microscopic determination of a Tobacco necrosis virus crystal structure.**

Labaw (L. W.). **An electron microscopic determination of the Rothamsted Tobacco necrosis protein crystal structure.**

Labaw (L. W.) & Wyckoff (R. W. G.). **The electron microscopy of Tobacco necrosis virus crystals.** *J. ultrastruct. Res.*, **2**, 2, pp. 177–184, 4 fig., 1958; **3**, 1, pp. 8–15, 6 fig.; pp. 58–69, 4 fig., 1 diag., 1959.

These papers from the Nat. Inst. Health, Bethesda, Md, include a series of most striking electron micrographs depicting shadowed carbon replicas of the octahedral and rhombic crystals of tobacco necrosis virus at magnifications of ×53,500–190,000.

Steiner (W.). **Sommertagung des D L G-Ausschusses für Tabakbau.** [Summer session of the German Agricultural Association Committee for Tobacco Cultivation.]—*Dtsch Tabakbau.* **38**, p. 145, 1958. [*Ber. Inst. Tabakforsch. Dresden*, **6**, 1, p. 154, 1959.]

During a tour of the tobacco-growing districts of Baden from 30 July–1 Aug. 1958, a clear-cut correlation was observed between the development of viroses in tobacco and the proximity of virus-diseased potatoes. The best defence against vein necrosis [potato virus Y: **39**, 242 and below] lies in the use of resistant vars., especially 230 [loc. cit.] and SCR.

Seehofer (F.), Thran (P.), & Carstens (H.). **Über die Einflüsse von Klima und Boden auf die Verbreitung des Tabak-Rippenbräune-Virus.** [On the influences of climate and soil on the distribution of the Tobacco vein necrosis virus.]—*Dtsch. Tabakbau*, **38**, p. 125, 1958. [*Ber. Inst. Tabakforsch. Dresden*, **6**, 1, p. 154, 1959.]

The 1st signs of deterioration in quality are stated to be discernible when the incidence of vein necrosis [potato virus Y: see above] reaches 10–20%; at 60–70% harvesting begins to become unprofitable. In diseased leaves there is a reduction in sugar and ash and an increase in nicotine and albumin. The centre of max. infection in Schleswig-Holstein lies S. and E. of the Sachsenwald, with a steady decline towards the N. and W. Soil and climatic factors are predominant in determining the distribution and severity of the virosis. At a temp. sum-total of 34·2° C. and a rainfall of 115 mm. during June and July 1957, 100% infection was reached. The disease is most virulent on moorland and decreases slightly on heath, woodland, and high ground, in that order.

Szirmai (J.). **A Burgonya Y-vírusának érbarnulást okozó változata a Dohánykultúrákban.** [A variant of Potato virus Y causing vein necrosis in Tobacco.]—*Növénytermelés*, **7**, 4, pp. 341–350, 7 fig., 1958. [Russ., Engl., Germ. summ.]

The Res. Inst. for Plant Protection, Budapest, reports that this disease [cf. above]

is becoming increasingly prevalent on field tobacco in Hungary, particularly on the var. Szabolcsi. The virus was mechanically transmitted to other vars. of tobacco and to some other plants, the period of latency in each being longer than with the common Y str.; on *Capsicum annuum* [**38**, 556] mosaic spots (without vein necrosis) developed after 30 days.

Vekemans. **Methoden der Bekämpfung der Tabakfeinde.** [Methods for the control of Tobacco pests.]—*Rev. int. Tabacs*, **33**, 303, p. 59; 304, p. 83, 1958. [*Ber. Inst. Tabakforsch. Dresden*, **6**, 1, p. 157, 1959.]

A general survey of dusting, spraying, and vaporization methods is followed by directions for their application to tobacco. Leaf spots [? on seedlings] caused by *Alternaria longipes*, *Cercospora nicotianae*, and *Pseudomonas tabaci* should be treated by a dip in $AgNO_3$ and on stands by spraying with Bordeaux mixture, dichlone, zineb, Cu oxychloride, or Cu oxide. As a substitute for the old-established S treatment for *Erysiphe cichoracearum*, karathane WD may be applied at weekly intervals. Control of tobacco mosaic virus depends upon the most stringent hygienic measures and that of rosette [tobacco mottle and vein distorting viruses] on a campaign against the aphid vectors.

Hidaka (Z.) & Murano (H.). **Studies on the streptomycin for plants. IV. The absorption and translocation of streptomycin in the Tobacco stem and the extraction of streptomycin from the leaves following leaf-surface absorption. V. The absorption and translocation of S^{35} labelled streptomycin sulphate in the Tobacco plant.**—*Ann. phytopath. Soc. Japan*, **24**, 2, pp. 119–121; 3, pp. 161–174, 8 pl. (16 fig.), 1 fig., 3 diag., 1959. [Jap. Abs. from Engl. summ.]

In further studies [cf. **37**, 185] at the Hatano Tobacco Exp. Sta., streptomycin applied to the base of tobacco stems at 1,000 μg./ml. was readily translocated to the upper leaves. At higher concs. most of it was translocated to the upper leaves, less to the middle leaves, and still less to the lower. All the streptomycin applied to tobacco leaf surfaces was retained following immersion of the leaves in tap water for 8 hr., and there was little reduction after 24 hr. so that rain or dew will be unlikely to remove streptomycin from the leaves.

Radio-autographs of S^{35} labelled streptomycin applied to tobacco plants showed that little movement occurred in the leaves when the antibiotic was absorbed through the surface, but there was some movement towards the leaf tips when it was applied to the mid rib, and transfer through the xylem into the upper leaves occurred within 24 hr. when applied at the stem base from a cotton wool band.

Kerr (A.), Edwards (G. R.), & Wishart (R. L.). **Tomato diseases in South Australia.**—*J. Dept. Agric. S. Aust.*, **62**, 8, pp. 365–376, 8 fig.; 9, pp. 414–423, 10 fig.; 10, pp. 457–466, 8 fig.; 11, pp. 504–510, 8 fig.; 12, pp. 546–549, 551, 1959.

This is a series of articles based primarily on an earlier bulletin [cf. **10**, p. 413]. In the 1st a general introduction is followed by a key for identification of the diseases, based on symptoms, and descriptions of those caused by soil inhabiting fungi; the 2nd deals with diseases caused by fungi which are spread by wind and water; virus, bacterial, and nematode diseases are covered in the 3rd; physiological and miscellaneous in the 4th; and control measures in the 5th.

A separate section is devoted to physiological diseases including blossom end rot, puffiness, catface, urea damage, sun scald, growth cracks, leaf roll, and other miscellaneous diseases. The last section in the series deals with general methods of control (seed treatment, cultural practices, resistant vars., spraying and dusting), soil sterilization and fumigation, and disease control material.

Ciferri (R.). **Malattie del Pomodoro nella Pianura Padana.** [Tomato diseases in the Po Valley.]—*Notiz. Malatt. Piante* 49–50 (N.S. 28–29), pp .90–100, 1959. [Engl. summ.]

Xanthomonas vesicatoria [**39**, 48] and *Corynebacterium michiganense* [cf. **38**, 291] are apparently serious; many virus diseases are present, differing with the district and the season; outstanding fungus diseases are those caused by *Phytophthora infestans*, *Alternaria solani*, *Cladosporium fulvum* [cf. **35**, 508], and *Septoria lycopersici* [**39**, 48], the last-named being prevalent in all parts of the area in 1958, and *Phoma destructiva* fruit rot [loc. cit.]. For the control of fungus diseases of the aerial parts zineb and ziram [**38**, 123] should be used alternately or mixed, 1 or 2 applications of Cu derivatives (such as Caffaro powder) being given in addition.

Grümmer (G.) & Günther (Elisabeth). **Spritzversuche zur Bekämpfung der Fruchtfäulen an Tomaten.** [Spray trials for control of fruit rots of Tomato.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F. **13**, 7, pp. 122–126, 2 fig., 3 graphs, 1959. [Russ., Engl. summ.]

In recent years fruit rots of tomato, principally blight (*Phytophthora infestans*) [cf. **38**, 280], have been so severe in the coastal regions of E. Germany that tomato cultivation has been discontinued on many farms. The 1st significant attacks generally start in early Aug. and spread rapidly. In trials over 7 yr. at the Institut für Agrobiologie, Ernst-Moritz-Arndt Univ., Greifswald, 3 or 4 applications of 1% cupral, beginning in the latter half of July, gave good control. The early vars. Fanal and Fruhe Liebe, 2nd earlies Beymes Erntesegen and Vollendung, and the late Rheinlands Ruhm and Vortreffliche, as well as the dwarf var. Perfekta, are recommended for the region, the choice being restricted to Fanal and Fruhe Liebe when spraying is impossible.

Ashour (W. E.) & El-Kadi (M. M.). **Cultural studies on Fusarium semitectum, Alternaria tenuis and Rhizoctonia solani which cause damping off of Tomato seedlings.**—*A'in Shams sci. Bull., 1958*, 3, pp. 57–68, 1 fig., 1959.

Of 5 media examined at the Fac. Agric., A'in Shams Univ., potato dextrose agar and Richards's medium gave the most rapid growth of these fungi [cf. **37**, 740]. *F. semitectum* grew fastest. For *F. semitectum* and *Alternaria tenuis* the opt. temp. on Richards's medium was 25° C., and for *Rhizoctonia* [*Corticium*] *solani* 30°. Best growth of *F. semitectum* and *C. solani* occurred at R.H. 92·9–100% and of *A. tenuis* at 75·5%. Tables show the variation of growth (based on mycelial dry wt.) in response to adjustment of the conc. of sucrose and KNO_3 in Richards's solution, and of dry wt., radial growth, and sporulation or production of sclerotia after the elimination of various constituents of the medium. In general the best growth occurred at pH 4·2 and 6 [**34**, 312].

Bel'tyukova (Mme K. G.), Kulikovs'ka (Mme M. D.), & Gvozdyak (R. I.). Про застосування методу обприскування Томатів аренарином. [The use of arenarin as a method for spraying Tomatoes.]—*J. Microbiol., Kiev*, **21**, 4, pp. 31–34, 1959. [Russ. summ.]

At the Inst. Microbiol., Acad. Sci. Ukr. S.S.R., spraying tomatoes at the bud stage with a 1:10,000 aqueous solution of arenarin [cf. **38**, 731] increased the number of fruits by 19–30%, according to the locality of the test, yield was raised by 21–30·8%, and fruit infection by bacterial canker [*Corynebacterium michiganense*: **38**, 628] reduced to $\frac{1}{3}$.

Klement (Z.). **A Paradicsomot károsító Xanthomonas vesicatoria (Doidge) Dowson előfordulása hazánkban.** [*X. vesicatoria* on Tomato in Hungary.]—*Növénytermelés*, **7**, 1, pp. 73–78, 1 fig., 1958. [Russ., Engl. summ.]

This information has been noticed [**39**, 213]. The pepper (*Capsicum annuum*)

and tomato strs. differed; the phage specific for the former failed to lyse the latter.

Gigante (R.). **Danni da carbolineum in semenzai di Pomodoro.** [Damage caused by carbolineum in Tomato seed-beds.] –*Boll. Staz. Pat. veg., Roma*, Ser. 3, **16** (*1958*), 2, pp. 121–128, 4 fig., 1959. [Engl. summ. 15 ref.]

A full description is given of damage caused to young tomato plants in a wooden construction treated about a week before sowing with carbolineum [cf. **5**, 45]. The effects were very similar to those caused by tar fumes [cf. **5**, 644 *et passim*]. Yellow, later brown, areas appeared on the leaves, which acquired a metallic brilliance, became wrinkled, deformed, and necrotic, and finally dried up.

Harley (J. L.) & Ap Rees (T.). **Cytochrome oxidase in mycorrhizal and uninfected roots of Fagus sylvatica.**—*New Phytol.*, **58**, 3, pp. 364–386, 17 graphs, 1959.

A full account of studies already noticed [**38**, 165].

Akhundov (T. M.). Азәрбајҹанда Шабалыдын гонур ләкә (силиндроспороз) хәстәлији вә она гаршы мубарizә тәдбирләри. [Brown spot (cylindrosporosis) of Chestnut in Azerbaijan and its control.]—Мә'руз. Елмл. Акад. Азәрбај. ССР [*Proc. Akad. Elml. Azerbaij. S.S.R.*], **15**, 9, pp. 866–869, 2 fig., 1959. [Russ. summ.]

At the Azerbaijan Nature Preservation Sta., observations were made on a tan leaf spot, often with light brown fringes, caused by *Cylindrosporium castanicola* [*C. castaneae*: cf. **28**, 146], the perfect state of which is believed to be *Mycosphaerella maculiformis* [cf. **36**, 673]. Infection can develop within the range 2°–39° C. (opt. 23–28°) after incubation for 9–11 days. Recommendations for control are: to destroy the fallen leaves in autumn; to apply to the soil round the trees superphosphate at 600 kg./ha., K at 500 kg., and NH_4NO_3 at 400 kg. in Apr. and subsequently to loosen this soil; to spray with 0·7% zineb towards the end of May and the end of June.

Epstein (A. H.). **A moist-chamber technique for culturing large numbers of Elm twig specimens.**—*Plant Dis. Reptr*, **43**, 11, p. 1195, 2 fig., 1959.

Adapted by the Wis. State Dept Agric., Madison, for mass culture preparation of *Ceratocystis ulmi*, this technique gave the best results with wide-mouth, square, 2-oz., flint glass bottles (Cenco 10405) with metal screw caps, as the moist chambers, and a 3% solution of sucrose plus 1% yeast extract as a medium. Several $\frac{1}{2}$-in. sections cut from the bark-free twigs with a pair of disinfected shears were placed in each bottle. The average incubation period for production of coremia was 5–6 days, which is comparable to the potato dextrose agar plate method.

North (C. P.) & Wallace (A.). **Nitrogen effects on chlorosis in Macadamia.**—*Calif. Macad. Soc.*, **5**, pp. 54–67, 1 fig., 1959.

The chlorosis patterns for Fe, Mn, and Zn deficiencies were investigated in rooted cuttings from field-grown macadamia trees (var. Hawaiian 245 and the Australian J-3) exhibiting symptoms after treatment with N fertilizer at the Univ. Calif., Los Angeles. The leaves of Zn-deficient Hawaiian 245 plants were nearly as dark green as the controls, but their upper stems were very slender and developed partial S-curves, apparently from weakness. Zn-deficient J-3 had paler leaves, but the stems did not exhibit any weakness. Zn content as low as 11 p.p.m. produced no noticeable interveinal chlorosis, but leaves containing > 20 p.p.m. were pale green. The leaves of Fe-deficient plants had narrow green zones along the veins with interveinal chlorosis. Slight chlorosis occurred at 30 p.p.m. Fe when P content was

0·2% or more, but at lower P (0·1%) no chlorosis was produced even at 20 p.p.m. Fe. Mn deficiency [cf. **27**, 154] symptoms occurred at 10 p.p.m. Mn, and took the form of a wedge-shaped dark green zone along the midrib and extending along the lateral veins. Plants with combined Mn and Zn deficiency were smaller and the leaves lighter green; Fe+Zn-deficient plants exhibited slight interveinal chlorosis on the leaves which were lighter green than controls; Fe+Mn-deficient plants were noticeably brittle. Applications of chelated Fe to non-lime soils as well as to those with excess lime are recommended.

Matuo (T.), Shimizu (N.), Takagi (T.), & Kubota (E.). **Studies on the change of the pathogenicity of Gibberella lateritium (Nees) S. et H. by passing through Mulberry stems, and the pectic enzymes-production of the fungus.**—*Ann. phytopath. Soc. Japan*, **23**, 5, pp. 245–250, 1 fig., 3 graphs, 1958. [Jap. Abs. from Engl. summ. Received Nov. 1959.]

At the Faculty of Textiles and Sericulture, Shinshu Univ., Ueda, *G. lateritia* [**38**, 718] was found to enter mulberry stems in autumn via injuries on the surface and slowly develop there during the dormant season. Some of the strs. increased in pathogenicity (estimated by the area of lesions compared to those produced by str. No. 1 of relatively constant pathogenicity) after passing through the living mulberry stem; this increase was not lost after 1 yr. in culture, but no additional increase occurred when the pathogen was passed through the host twice. Pectinase production by the fungus in culture (on modified glucose-asparagine medium) was independent of the pathogenicity of the str., but the production of pectase was parallel to it.

Arnold (B. C.). **Isolation of a fungus from mycorrhizas of Nothofagus cliffortioides (Hook f.) Oerst.**—*Trans. roy. Soc. N.Z.*, **87**, 3–4, pp. 235–241, 1 pl., 1959.

A fungus resembling *Mycelium radicis fagi* was isolated from mycorrhiza of *N. cliffortioides* [cf. **36**, 560] at the Bot. Dept, Univ. Canterbury, N.Z. Filtrates from liquid cultures of the fungus showed strong auxin activity. It is suggested that secretion of auxin by ectotrophic mycorrhizal fungi tends to inhibit growth of the host roots, thus enabling the mantle to envelop them.

Himelick (E. B.) & Neely (D.). **Hyperparasitism of a powdery mildew fungus on the London Plane tree.**—*Phytopathology*, **49**, 12, pp. 831–832, 2 fig., 1959.

At Univ. Ill., Urbana, the foliage of both London plane (*Platanus acerifolia*) and American sycamore [*P. occidentalis*] was attacked by *Microsphaera alni* [cf. **34**, 759 *et passim*] in 1958, the former (a new host record for the Mid-west) the more severely (up to 25–30% leaves affected). *M. alni* was constantly hyperparasitized by *Cicinnobolus cesatii* [cf. **26**, 142; **33**, 188], a new host record for the United States.

Itô (K.). **Parasitic diseases of Poplars in Japan.**—22 pp., 32 fig., Tokyo, Min. Agric. and Forestry, 1959.

Published information, especially that since 1950, is summarized [**34**, 497]. Foliage diseases include the widely distributed yellow leaf blister (*Taphrina aurea*), powdery mildew (*Uncinula salicis*), leaf blotch (*Septotinia populiperda*) [cf. **38**, 427] which appeared in 1956 and was severe in 1958, 5 spp. of *Melampsora*, of which *M. larici-populina* [**25**, 145] is the commonest, leaf spots caused by *Phyllosticta populorum*, *P. alcides*, and *Pestalotia populi-nigrae* [**30**, 549], spot anthracnose (white spots in summer and black spots in autumn, both probably caused by *Sphaceloma populi*), and leaf blight (*Marssonina brunnea*), serious since 1957.

Fruit pocket is caused by *T. johansonii* and diebacks and cankers by *Glomerella cingulata*, *Cenangium* sp., *Valsa sordida*, and *Diaporthe* ? *medusaea*. The diseases

caused by *Septobasidium bogoriense* and *S. tanakae*, and a shoot blight caused by *Pestalotia populi-nigrae* are not serious. Common root rots are white (*Rosellinia necatrix*), violet (*Helicobasidium mompa*) [cf. **30**, 337], and *Armillaria mellea*. *Fomes igniarius* and *F. applanatus* [*Ganoderma applanatum*] are found on old trees. For each disease susceptible spp. and hybrids are listed.

Schönhar (S.). **Zur Frage der Bekämpfung von Dothichiza populea (Erreger des Pappelrindentodes).** [On the question of control of *D. populea* (the agent of Poplar bark canker).]—*Forst u. Holz*, **12**, 24, pp. 421–422, 1957.

In tests described from the Forstliche Versuchsanstalt, Stuttgart, spraying at least 3 times with 0·5% cupravit or 0·3% orthocide 50 in May–Sept. reduced attack by *D. populea* in poplar nurseries, orthocide being the more effective [cf. **36**, 143]. In wet summers, if old poplars are growing nearby, 5–7 sprays are advisable. Considerable infection occurred through undamaged bark, though penetration was easier where there were wounds [cf. **36**, 738]. Comparatively resistant in inoculation tests [cf. **37**, 423] were *Populus tremula*, *P. trichocarpa*, *P. regenerata*, *P. alba* × *P. grandidentata* and the vars. Neupotz, Oxford, and Rochester.

Kegler (H.). **Das Ringfleckenmosaik der Eberesche (Sorbus aucuparia L.).** [Ring spot mosaic of the Mountain Ash (*S. aucuparia*).]—*Phytopath. Z.*, **37**, 2, pp. 214–216, 1 fig., 1959.

This new virus disease, observed on young, 1–2-yr.-old plants and on trees over 10 yr. old, is reported from the Inst. für Phytopath., Aschersleben, Germany. Chip bud transmissions from infected to healthy *S. aucuparia* induced necrotic spots and light green flecking. The symptoms are light green ring-, spot-, or band-like discoloration of the leaves, not like those of ash infectious variegation virus, but apparently identical with those of a disease reported by Jamalainen [cf. **37**, 341] to be fairly widespread in Finland.

Vidal Hall (M. P.) & Williams (G. H. D.). **Teak as a plantation tree in the Sudan.** —*For. Mem., Sudan* 8, 14 pp., 1 graph. 1956. P.T.5 (1*s.*) [Received Jan. 1960.]

On p. 11 it is stated that only 1 fungus (possibly *Helicobasidium* sp.) [cf. **9**, 563] has been found to cause serious damage to teak in the Republic of the Sudan, and the injury it causes is only on a small scale. The symptoms are a softening and blackening of the bark near the root collar, the infected trees dying, usually in small groups. Spread is arrested when dead and dying trees are removed, possibly as a result of the admission of sunlight.

Parmeter (J. R.), Hood (J. R.), & Scharpf (R. F.). **Colletotrichum blight of Dwarf Mistletoe.**—*Phytopathology*, **49**, 12, pp. 812–815, 4 fig., 1959.

Heavy infection by *C. gloeosporioides* [*Glomerella cingulata*] on shoots of *Arceuthobium campylodum* f. *abietinum* [cf. **26**, 86; **35**, 335] on red fir (*Abies magnifica*) in the northern Sierra mountains, Calif., was investigated by Univ. Calif., Berkeley. Shoots in all stages of development were killed rapidly, and the endophytic system was also invaded. In an area of intense infection only 18·5% of 372 mistletoe cankers examined had healthy shoots. The possibility of biological control of the mistletoe is indicated.

Wilson (C. L.). **A new disease of Arizona Cypress.**—*Arkans. Fm Res.*, **8**, 4, p. 11, 2 fig., 1959.

A blight disease of *Cupressus arizonica* is reported from Univ. Ark. agric. Exp. Sta., Fayetteville. It starts in the lower, inner branches and progresses upwards. The tip of the needle usually dies, then the remainder turns bronze. Later, affected

needles and branches become reddish brown and young trees may be killed within 1 yr., or the disease may remain static on the lower branches. An associated fungus resembles *Cercospora thujina*, which causes blight on arbor vitae [*Thuja*: **27**, 175]. A similar fungus is associated with blighted junipers (*Juniperus virginiana*) in the area. The fungus from cypress reproduced the disease on cypress and also caused blight on *Thuja*, while the fungus from the latter caused blight of both hosts.

Schönhar (S.). **Bekämpfung der durch Meria laricis verursachten Lärchenschütte.** [Control of needle cast in Larch caused by *M. laricis*.]—*Allg. Forstz.*, **13**, 8, p. 100, 1958.

Tests against *M. laricis* [cf. **36**, 797] on *Larix decidua* at the Forstliche Versuchsanstalt, Stuttgart, demonstrated the effectiveness of 0·5% Cu oxychloride (which caused some needle injury), captan, and zineb (both 0·3%). The need to spray in dry weather is stressed. An application should be made as soon as the 1st symptoms are observed, with a 2nd not more than 1 month later. In wet summers 4–5 applications may be required.

Patton (R. F.) & Riker (A. J.). **Artificial inoculations of Pine and Spruce trees with Armillaria mellea.** *Phytopathology*, **49**, 9, pp. 615–622, 5 fig., 1959. [27 ref.]

A. mellea has killed apparently vigorous trees in 7–10-yr.-old conifer plantations throughout central and N. Wis. At Univ. Wis., Madison, inoculum [cf. **35**, 706 *et passim*] obtained by growing the fungus for a few months in glass jars on sterilized pine root segments $\frac{1}{4} \times 2–2 \times 6$ in. (size appeared immaterial), 'started' with 25 g. of Campbell's [**13**, 483] C medium, was used to infect 2–4-yr.-old red, white, and Jack pine [*Pinus resinosa*, *P. strobus*, and *P. banksiana*] and white spruce [*Picea glauca*] in pots and 8–10-yr.-old red and white pine in plantations by placing the inoculum touching or near the roots. After 10–35 months, in potted trees, the fungus was alive in 83% of 82 inoculum segments, 68% of which produced rhizomorphs in < 12–30 months. Of 128 potted trees, 58 were infected from 41 inoculations within 12–35 months; isolates (all rhizomorph-forming) from different suscepts infecting spp. other than their original hosts. Of 79 plantation trees inoculated, 21 were infected in 27–96 months, infection invariably following contact between rhizomorphs and roots. Considerable variation in the time needed for rhizomorph development and subsequent infection was evident with the inoculum used.

Fischer (H.). **Betrachtungen zur Entwicklung der Schütteerkrankung der Kiefernkulturen im Klever Reichswald.** [Observations on the development of needle-cast of the Pine stands in the Kleve State Forest.]—*Forst u. Holz*, **14**, 18, pp. 402–404, 2 diag., 1959.

The following conclusions are based on experiments in the above-mentioned region of W. Germany from 1955–59. Even in years such as 1958, when weather conditions were unfavourable to the development of needle-cast [*Lophodermium pinastri*: **37**, 744 and below], spraying of the residual foci of infection should not be omitted. Under local conditions it should be continued until the trees have reached such a height that the major portion of the crown is out of reach of the spores [**38**, 130]. Severely infected areas (over 30% diseased needles) should be treated twice, while 1 application (at the beginning of the 2nd half of Aug., according to experience gained in 1958) appears to suffice generally to control more moderate attacks.

Mayer-Krapoli (H.). **Pflanzenschutz und Düngung.** [Plant protection and manuring.]—*Forst u. Holz*, **15**, 1, pp. 10–12, 1960.

In connexion with the relatively poor results of spraying against pine needle-cast [*Lophodermium pinastri*] in Germany in 1958 and 1959 [see above], the writer

reviews some studies on the importance of soil amendments in the control of this disease. In his experience (*Allg. Forst- u. Holzw. Ztg*, **12**, 37–38, 1957), the higher the N and P contents of the soil, the less prevalent was the pathogen.

Peterson (R. S.). **The Cronartium coleosporioides complex in the Black Hills.**—*Plant Dis. Reptr*, **43**, 12, pp. 1227–1228, 1959.

From the Rocky Mountain Forest and Range Exp. Sta., Fort Collins, Colo., the occurrence is noted for the 1st time in the areas concerned of *Peridermium harknessii* [cf. **38**, 718] damaging ponderosa pine [*Pinus ponderosa*] in the Black Hills, eastern Wyo. and S. Dak., and abundant on lodgepole pine (*P. contorta*) and Scots pine (*P. sylvestris*) in some localities of S. Dak.; *Peridermium filamentosum* was also found on *Pinus ponderosa*, but was of little account. *C. coleosporioides* [cf. **36**, 686] was abundant on 2 *Castilleja* spp. and on *Orthocarpus luteus*, sometimes adjacent to pine with *Peridermium* spp.

Stutz (R. E.). **Control of brown stain in Sugar Pine with sodium azide.**—*For. Prod. J.*, **9**, 12, pp. 459–463, 3 fig., 1959.

Research at the Western Pine Ass., Portland, Oregon, indicated that brown stain in *Pinus lambertiana* is caused by a naturally occurring enzyme which can be inhibited by a dip in sodium azide solution 0·5 lb./100 gal.

Themlitz (R.) & Baule (H.). **Über das Auftreten von Nährstoffmangelsymptomen an jungen Kiefern als Folge unausgeglichener Düngung.** [On the occurrence of nutrient deficiency symptoms in young Pines as a sequel to unbalanced manuring.]—*Forst u. Holz*, **15**, 1, pp. 12–13, 1960.

It was demonstrated by experiments in Lower Saxony and Hessen in 1958 and 1959, respectively, that 'yellow tip' of young pines, prevalent on poor (especially old alluvial) soil and accentuated by N or NP amendments, may be prevented or cured by K_2SO_4 or potash magnesia at 84–90 kg./ha.

Jung (J.). **Über die Resistenz des Kambiums heimischer Laub- und Nadelhölzer gegen Bakterien und Pilze.** [On the resistance of the cambium of native broad-leaved trees and conifers to bacteria and fungi.]—*Naturwissenschaften*, **46**, 23, p. 656, 1959.

In further experiments at the Forstbotanisches Inst., Munich, Germany, using agar diffusion assay against *Bacillus subtilis* and *Aspergillus luchuensis* [cf. **36**, 197; **37**, 410], fungi- and bacteriostatic principles were demonstrated in the cambium of spruce, pine, maple [*Acer* spp.], birch, oak, ash, and poplar. The inhibition zone was 8–23 mm. for a crude extract solution of 900 μg. of the substance/ml. solvent.

Catalogue de la mycothèque de la Division de Biologie. [Catalogue of the collection of fungi of the Division of Biology.] –8 pp., Paris, Centre technique du bois, 1958. [Received Dec. 1959.]

A list of numbered cultures of ascomycetes and basidiomycetes from wood, on carrot or on malt agar, and their sources of origin, preceded by a note on their preservation under oil.

Jacquin (F.) & Mangenot (F.). **Populations microbiennes des bois. III. Humification in vitro d'une sciure de Hêtre.** [Microbial population of wood. III. Humification *in vitro* of Beech sawdust.]—*Plant & Soil*, **11**, 4, pp. 377–391, 1959.

In further work at the École nationale supérieure agronomique, Nancy, France [**37**, 324], *Trechispora* sp. causing white rot, isolated from wood shavings on cal-

careous soil, *Cytosporella* sp. causing blue stain, and 2 mixed natural inocula of various fungi also isolated from the wood shavings were cultured on beech sawdust [cf. **34**, 500] supplemented with peptone and mineral salts. The *T.* sp. acidified the medium, decomposed the lignin, and produced a large quantity of pale humic compounds. The natural inocula caused little decomposition of the lignin and produced dark humic compounds. Both these inocula, and also the *C.* sp., in mixed culture with the *T.* sp. produced a humus of intermediary type, with a considerable increase in exchange capacity. These results are discussed in relation to the recent lit.

Wazny (J.). **Untersuchungen über die Einwirkungen von Merulius lacrymans Wulf. Fr. und Coniophora cerebella Pers. auf einige physikalische Eigenschaften befallenen Holzes.** [Studies on the effect of *M. lacrymans* and *C. puteana* on some physical properties of infected wood.] *-Holz. a. Roh- u. Werkst.*, **17**, 11, pp. 427–432, 14 graphs, 1959. [Engl. summ.]

The results of further studies [cf. **38**, 106] at the Inst. für Holzpath. und Holzkonservierung, Warsaw, showed that the 2 fungi caused the wt., vol., and sp. gr. of the wood of pine (sapwood and heartwood separately), spruce, beech, and oak to decrease with prolonged attack, though in individual cases in the initial stage there was a slight increase in vol. Sp. gr. was not very useful in determining the degree of destruction. Sorption and swelling of pine heartwood and oak decreased at first but then increased, while there was an immediate increase in both features in pine sapwood, spruce, and beech. Shrinkage was similar with all wood spp.; after fungal attack and after drying it was considerably greater than swelling. Hygroscopicity decreased in relation to wood destruction. *C. puteana* caused a greater change of properties than *M. lacrymans*; their influence decreased in the order spruce, pine sapwood, beech, pine heartwood, and oak.

Damoiseau (R.). **De la protection des bois de grumes et des sciages frais.** [On the protection of log wood and newly sawn timber.] *Bull. Inform. Inst. Étud. agron. Congo belge*, **8**, 4, pp. 239–247, 1959.

General directions are given for the preservation of timber after felling until required for use, including short sections dealing with fungal rotting and staining.

Report of Committee 17 : wood preservation. — *Proc. Amer. Rly Engng Ass.*, **60**, pp. 341–377, 11 fig., 1959.

The report includes a specification covering petroleum solvent for pentachlorophenol, which is recommended for adoption, and service records on posts treated with standard and promising new preservatives.

Graham (R. D.) & Wright (E.). **Stronger spray cuts pole rot.** *Elect. World, N.Y.*, **152**, 4, p. 60, 1959.

A report is presented on the co-operative pathological and chemical studies by the Forest Products and Forest Lands Res. Centers and the Bonneville Power Administration, Portland, Oregon, on poles of inner sapwood of western red cedar [*Thuja plicata*], both unsprayed and treated with a 5·6% pentachlorophenol solution. Some of the poles had been in service for 25 yr. at the time of spraying and for another 5 before sampling, while for others the corresponding figures were 15 and 2.

Living fungi, including an unidentified agent of wood decay, *Hormodendrum*, *Stemphylium*, *Penicillium*, and *Trichoderma* spp., were cultured from all the unsprayed and 90% of the sprayed. Those from the former developed in 5–7 days and from the latter in 23–28 days. The av. preservative content of the sapwood samples analysed was 0·1 lb./cu. ft. Fungal growth in culture occurred in inner

sapwood with retentions up to 0·13 lb. but not at or above 0·16, except for 1 pole with a pentachlorophenol content of 0·28 lb./cu. ft. which yielded the decay fungus.

On the basis of these findings it is recommended that the conc. of preservative should be increased to 10% to ensure a min. retention of 0·16 lb./cu. ft. in the inner 0·2 in. sapwood.

Nelson (M. R.) & Pound (G. S.). **The relation of environment to the ringspot (Mycosphaerella brassicicola) disease of crucifers.**—*Phytopathology*, **49**, 10, pp. 633–640, 3 fig., 1959.

A more detailed account of information already noticed [**38**, 552].

Van Hoof (H. A.). **Vallers en kanker in Bewaarkool.** [Dry rot and canker in stored Cabbage.]—*Meded. Dir. Tuinb.*, **22**, 5, pp. 256–263, 3 fig., 1959. [Engl. summ.]

Phoma lingam [cf. **39**, 200] is the cause of both these diseases in the Netherlands [**6**, 329]. Symptoms of dry rot appear after transplanting as a leaden discoloration of the leaves; the death of the tap-root results in decay of the plants. Canker develops only during storage, when the fungus penetrates from the vascular bundles into the pith and cortex, forming dark, sunken lesions. Diseased seed is the principal source of infection, which may persist for as long as 10 yr. Partial control may be effected by seed treatment with organic Hg under favourable growing conditions, but not where soil structure and drainage are adverse to the plant. Further investigations are required to elucidate other factors affecting the host-fungus balance. No differences in resistance were observed in 1951–2 between 28 selections of the very susceptible red cabbage or in 1952–3 between 17 horticultural lines.

Oka (I. N.). **Preliminary notes on a disease of Cabbage in Ngablak and Pakis, Magelang region, central Java.** [Indonesian. Abs. from Engl. summ.] –*Contr. gen. agric. Res. Sta. Bogor* 154, 15 pp., 5 fig., 1959.

According to this report from the Inst. of Plant Diseases and Pests, Bogor, Indonesia, this disease, apparently new for Java, is caused by *Rhizoctonia* sp. It attacked cabbage seedlings approx. 3 weeks old, causing chlorosis and dropping of the lower leaves, poor development of roots, and usually the death of the plant. The infection may have spread from partially decayed compost, influenced by excessive rainfall.

Matthews (R. E. F.) & Lyttleton (J. W.). **Heat inactivation of Turnip yellow mosaic virus in vivo.**—*Virology*, **9**, 3, pp. 332–342, 1 graph, 1959.

At the Plant Diseases Div., Auckland, New Zealand, the multiplication of turnip yellow mosaic virus in Wong Bok Chinese cabbage [cf. **37**, 612] was found to be checked when the plants were kept at 33° C., though the conc. of virus already present fell no more rapidly than that of normal leaf protein. Although the virus from heat-treated plants did not differ from the normal virus in the physical, chemical, and serological tests applied, its infectivity was greatly reduced.

Azad (R. N.) & Sehgal (O. P.). **A mosaic disease of Chinese Sarson (Brassica juncea (Linnaeus) Coss. var. rugosa Roxb.).**—*Indian Phytopath.*, **12**, 1, pp. 45–52, 6 fig., 1959.

At the Indian agric. Res. Inst., New Delhi, it was shown that the mosaic virus which causes vein clearing, green vein banding, mottling, and severe puckering of flowers in Chinese mustard (*B. juncea*) in the Simla Hills, India, is non-persistent and belongs to the turnip virus 1 [turnip mosaic virus] group [cf. **28**, 318; **36**, 77]. It is transmissible by sap and by *Aphis gossypii*, *Brevicoryne brassicae*, and *Myzus*

persicae. The virus was transmitted to a number of cruciferous hosts and also to zinnia and tobacco, the symptoms induced on which are described. In the genus *Brassica* it was transmissible only to spp. of the 'mustard' group. The virus, which is not seed-borne, is inactivated between 52–55° C. by 10 min. exposure and has a dilution end point between 1:1,000 and 1:3,000; it survives *in vitro* for about 9 days.

Leuchs (F.). **Über Beziehungen zwischen Fäulniserscheinungen, Wundheilung und Kaliversorgung an Rosenkohl.** [On the relationship between rotting, wound healing, and potash supply in Brussels Sprouts.]—*Z. PflKrankh.*, **66**, 8, pp. 499–508, 1 graph, 1959. [Engl. summ.]

In recent years there have been reports from the Cologne-Bonn region, especially the lower reaches of the Erft valley, of important losses of Brussels sprouts by an [unspecified] bacterial rot (cf. Blunck & Leuchs, *Rhein. Mschr. Obstb.*, **43**, pp. 13–14, 1955), primarily affecting firm mature sprouts and usually starting in the lower parts of the plant. All lesions were found to start from wounds, often insect damage. Not all wounds were affected, and plants on plots without the disease had as many wounds as those with the disease.

In fertilizer experiments maintenance of an $N:K_2O$ ratio of 1:2 was found to accelerate wound healing, thus significantly reducing the incidence of the disease as compared with that in plots given no K.

Tanrisever (A.). **Türkiyede Şeker pancarı virus sarlığı (yellows) hastaliği ve zarar derecesi.** [Virus yellows of Sugar beet in Turkey and the resultant losses.]—*Şeker*, **8**, 31, pp. 3–8, 2 fig., 1959. [Engl. summ.]

Field experiments over a 4-yr. period at the agric. Res. Lab., Sugar Refinery Corp., Eskişehir, Turkey, to determine sugar beet losses from artificial and natural infection of virus yellows [cf. **37**, 256], following the 1st report of the disease in Turkey in 1952, were inconclusive owing to heavy aphid infection. In 1958, however, when the aphid population was relatively low, 2 inoculation experiments showed a loss in root yield of 23–27%, both under irrigated and dry conditions, with an additional loss of sugar content of up to 1·1 polarization degree under dry conditions only. By delaying inoculation 15 days, root losses were reduced from 26·1% to 10·8%, and a further 17 days delay reduced it to zero.

Steudel (W.) & Thielemann (Rose). **Versuche zur Übertragung des Vergilbungsvirus der Beta-Rüben nach Passage durch einzelne Vektorarten.** [Experiments in the transmission of the Beet yellows virus after passage through separate vector species.] —*Phytopath. Z.*, **36**, 3, pp. 302–313, 1 graph, 1959. [Engl. summ.]

In an infection test in 1958 at the Inst. für Hackfruchtkrankheiten und Nematodenforschung, Elsdorf Rhld., Germany, a uniform strain of beet yellows virus [**38**, 235] was 1st transmitted from 3 aphid spp. to virus-free beets in the greenhouse and from these 3 groups of beets by the same 3 spp. to others in the field, though only 6 of the 9 possible transmissions was tested. The results of earlier experiments were confirmed [**37**, 257] and the relationships of virus passage through the individual vectors clarified. As before *Doralis* [*Aphis*] *fabae* and *Hyperomyzus tulipaellus* [*Rhopalosiphoninus staphyleae*] caused only ½ the yield reduction induced by equal numbers of *Myzodes* [*Myzus*] *persicae*, in spite of 100% transmission. When 1st infections were made with *A. fabae* or *R. staphyleae* and subsequent field infection with *M. persicae* the yield reduction was just as high as with *M. persicae*, showing that, under the conditions of the experiment, the virus was not reduced in virulence by passage through the former spp.; damage to the plants was dependent only on the vector used for the field infection and not on previous

infection. This emphasizes the importance of *M. persicae*. The results also explain the part that a mass multiplication of *R. staphyleae* can play in infecting only partially infected clamps.

WIESNER (K.). **Beiträge zur Rübenforschung. 2. Der Einfluss einer Mischinfektion von Rübenmosaik und virösen Rübenvergilbung bei Zuckerrübensamenträgern auf Entwicklung, Saatgutertrag und Saatqualität.** [Contributions to Beet research. 2. The influence of a mixed infection of Beet mosaic and Beet yellows virus on development, seed yield, and seed quality of Sugar Beet raised for seed.]—*Wiss. Abh. dtsch. Akad. LandwWiss., Berl.* 38, pp. 74–90, 5 fig., 1959. [Russ., Engl. summ.]

Some of the results of these trials have been noticed [**38**, 637]. Plants infected by a mixture of the 2 viruses were smaller and bore fewer leaves, but heading was not affected. Infection in the 1st year reduced seed production by 45–65%, the date of infection being of little consequence [cf. **32**, 162]. Losses of 40–50% resulted from infection early in the 2nd year. Infected plants mostly produced small seed clusters, but quality was less affected than yield. Under practical conditions a 10% increase in yellowing resulted in a lowering in seed yield of 0·55 dz./ha.

WENZL (H.). **Bedeutung und Bekämpfung der Infektion von Rübensaatgut durch Cercospora beticola Sacc.** [The importance of infection of Beet seed by *C. beticola* and its control.]—*PflSchBer.*, **23**, 3–4, pp. 33–58, 1 graph, 1959. [Engl. summ.]

In these experiments reported from the Bundesanstalt für Pflanzenschutz, Vienna, the number of conidia/g. seed was determined by shaking a 15 g. sample for 1 min. in 25 ml. water in an Erlenmeyer flask, and then inspecting 12 ml. samples in a Thoma counting chamber [cf. **37**, 748]. The numbers of leaf spots on field and glasshouse plants ran closely parallel with the level of seed infestation, though the damage resulting from a given level depended on varietal susceptibility. In field tests seed dressings [**39**, 137] improved yield but failed to prevent infection from the seed. During seed storage the fungus showed a gradual decline in sporulating ability, though in severe infections conidia were produced even after 2½ yr. It was demonstrated that the fungus may still prove infectious after conidial formation has apparently ceased. It is highly probable that seed with 10,000 or more conidia/g. remains infectious beyond the spring of the 2nd year after harvest. The level of primary infestation of the seed thus indicates its infectiousness.

The author concludes that in areas of heavy *Cercospora* attack seed contamination must be considered when lots are tested for purity, quality, and germination.

KOCH (F.). **Die Versuchsergebnisse der Arbeitsgemeinschaft zur Bekämpfung der Zuckerrübenkrankheiten Regensburg im Jahre 1958.** [The experimental results of the Arbeitsgemeinschaft zur Bekämpfung der Zuckerrübenkrankheiten, Regensburg, in 1958.] *Pflanzenschutz*, **11**, 7, pp. 95–98, 1959.

The year [cf. **38**, 46] was one of exceptionally heavy yields, resulting from ideal growing conditions during May–Oct. The incidence of *Cercospora* [*beticola*] was not heavy, although 1st symptoms appeared at the usual time: this is attributed to the success of the large scale spraying campaign, which is thought to have reduced the infection potential of the fungus surviving in leaf litter.

In fungicide trials against *C. beticola* significantly better sugar yields were obtained following seed treatment with panogen, albertan, fusariol, marktredewitz 3753, and 2 new (unspecified) germisan products. With careful attention to times of spraying 2 applications of brestan were equal to or better than 3 of cupravit, while with an equal number of applications brestan was superior to cupravit.

Krexner (R.). **Unerwünschte Nebenwirkungen organischer Saatgutbeizmittel.** [Undesirable side effects with organic seed disinfectants.] —*Pflanzenschutz*, **11**, 7, pp. 100–101, 1959.

In 1954, during routine seed dressing trials against black leg of beet [cf. **36**, p. 803] at the Bundesanstalt für Pflanzenschutz, Vienna, cerenox increased the *Cercospora beticola* attack from seed infection; a finding confirmed in 1957 by tests which also indicated that cerenox-special-gamma, containing an organic mercurial in addition to chinoxim benzoylhydrazone, was active against *Cercospora* seed infection. Further tests indicated that agronex (containing lindane) also promotes infection.

In an experiment in 1958 to determine the mode of action of cerenox and agronex in promoting the infection, non-infected seed of the susceptible var. Dobrovic, treated and untreated, was sown in the field. There was no difference in field infection between treated and untreated, indicating that the action of the fungicides was on the fungus, and not on the physiology of the host.

The author concludes that field testing is essential in assessing the value of seed dressings.

Malmus (N.). **Wurzelbrandkrankheiten im bayerischen Rübenbau im Jahre 1958.** [Black leg diseases in Beet cultivation in Bavaria in the year 1958.]—*Pflanzenschutz*, **11**, 7, pp. 101–103, 1 fig., 1959.

A note from the Bayerische Landesanstalt für Pflanzenbau und Pflanzenschutz, Munich, emphasizing that 'waisting' (Einschnürung) in sugar beet [cf. **36**, 744; **38**, 48] is still not properly understood. It is suggested, though not proved, that the condition results when a seedling affected by black leg [cf. **36**, 803] recovers to make good growth both above and below the lesion. At the lesion itself only the vascular strand remains, and the apparently sound plant readily snaps at the 'waist' thus formed. Waisting was quite often seen in the excellent crops in Bavaria in 1958, always associated with girth scab [cf. **37**, 202; **38**, 48].

Shevchenko (V. N.). Кагатная гниль Сахарной Свеклы и меры борьбы с ней. [Storage rot of Sugar Beet and measures for its control.] Сахар. Свек. [*Sakhar. Svek.*], **4**, 10, pp. 40–44, 1 fig., 1959.

The disease is caused by a complex of bacteria and fungi, including especially *Botrytis* [*cinerea*: **33**, 7; **38**, 172], *Fusarium* spp. [cf. **34**, 70], and *Rhizopus* [? *stolonifer*: cf. **34**, 69]. Incidence is practically limited to roots the resistance of which was previously lessened by wilting [cf. **33**, 7], frost [loc. cit.], and mechanical damage, or diseases acquired during growth. Accordingly any measures ensuring healthy growth of the plants [cf. **37**, 126, 195] have a prophylactic significance. It is recommended to keep storage temp. at 1–3° C. if possible. This can be achieved by protecting the open top of the stacks with mats in the day-time and leaving it uncovered and exposed to the cool air at night. Application of $Ca(OH)_2$ is also useful.

With the underground winter storage of roots for seed production the soil used for padding should have adequate moisture content and the required temp. can be maintained by varying the thickness of the surface soil according to atmospheric conditions.

Meier (W.), Bérces (J.), & Bamert (A.). **Die Blattrollkrankheit der Erbsen.** [Leaf roll disease of Peas.]—*Mitt. schweiz. Landw.*, **7**, 12, pp. 177–184, 2 fig., 1 graph, 1959.

A sudden widespread attack of pea leaf roll virus [**34**, 272; **37**, 748] in Canton Thurgau in early July 1958 is reported from the Eidg. Landw. Versuchsanst., Zürich-Oerlikon. Strict observation of crop rotation, with several yr. between legumes, is recommended for control, with stress on the importance of early sowing.

Kim (W. S.) & Hagedorn (D. J.). **Streak-inciting viruses of canning Pea.**—*Phytopathology*, **49**, 10, pp. 656–664, 2 fig., 1959. [31 ref.]

A more detailed account of information concerning the new MS pea streak virus from Minnesota and PO virus from New York, already noticed [**38**, 235].

Schroeder (W. T.), Provvidenti (R.), & McEwen (F. L.). **Pea streaks naturally incited by combinations of viruses.**—*Plant Dis. Reptr*, **43**, 12, pp. 1219–1226, 8 fig., 1959. [16 ref.]

At the N.Y. State Exp. Sta., Geneva, the cause of pea 'streaks', often resembling those ascribed to single viruses [see above] was shown by analysis on differential hosts to be a complex of red clover vein mosaic [**38**, 700] and strs. of bean yellow mosaic viruses. It follows that on pea vars. resistant to either component true streak symptoms will not develop. One of the isolated viruses resembling bean yellow mosaic or a str. of it proved infectious to vars. normally resistant to bean yellow mosaic virus, and combined with red clover mosaic virus caused severe streak on the pea vars. W.R. Perfection and Bonneville. This complex nature of pea streaks is important in view of the wide occurrence of the component viruses in the pea-growing areas.

Uehara (K.). **On some properties of phytoalexin produced as a result of the interaction between Pea (Pisum sativum L.) and Ascochyta pisi Lib. 1. On the activity as affected by ultraviolet irradiation and on some physicochemical properties of phytoalexin.**—*Ann. phytopath. Soc. Japan*, **23**, 5, pp. 230–234, 1 graph, 1958. [Jap. Abs. from Engl. summ. Received Nov. 1959.]

At the Hiroshima agric. College, Saijo, Hiroshima Prefecture, phytoalexin [**39**, 365] produced by the interaction between pea and *A. pisi* (a spore suspension deposited inside pods and left in a moist chamber at 22° C. for 24 hr. was then centrifuged for 30 min. at 3,500 r.p.m.) lost its activity almost completely after irradiation by UV light (1850–5780 A, chiefly 2537 A) at 45 cm. distance for 45–60 min. Complete inactivation of the phytoalexin was produced either by addition of active C (10 g./l.) and shaking for 5 min., or by drying for 24 hr. at 22°. The pH value and the electric conductivity (calculated from the electric resistance) of phytoalexin were 5·7–5·8 and 164×10^{-6} ohms, respectively.

Yerkes (W. D.). **Interaction of potassium gibberellate and a stunting Bean virus on Beans, Phaseolus vulgaris.**—Abs. in *Phytopathology*, **49**, 9, p. 555, 1959.

Plants of a climbing bean var. were treated at 2 growth stages with 50 p.p.m. K gibberellate or inoculated with the Mexican [str. of] bean [common] mosaic virus [**36**, 59]. K gibberellate rapidly stimulated growth rate by internode lengthening, but the virus slowed down growth considerably, taking effect several days after inoculation and almost stopping growth in 2 weeks. K gibberellate failed to stimulate the growth of mosaic-infected plants and its effect was counteracted by virus inoculation, results opposite to those obtained with other viruses [**37**, 80].

Bancroft (J. B.) & Kaesberg (P.). **Partial purification and association of filamentous particles with the yellow mosaic disease of Bean.**—*Phytopathology*, **49**, 11, pp. 713–715, 1 fig., 1959.

In studies at Purdue Univ., Lafayette, Ind. and Univ. Wis., Madison, rate- and equilibrium-zonal density-gradient techniques were used to separate bean yellow mosaic virus [cf. **35**, 260] from other plant constituents. Infectivity, though somewhat reduced, occurred mostly in the region 26–36 mm. below the meniscus. Electron micrographs confirmed the elongated, flexuous rod-like nature of the virus particles, about $20 \times 790 \pm 40$ mμ.

Snyder (W. C.), Schroth (M. N.), & Christou (T.). **Effect of plant residues on root rot of Bean.**—*Phytopathology*, **49**, 11, pp. 755–756, 1 fig., 1959.

At Univ. Calif., Berkeley, bean (*Phaseolus vulgaris*) root rot, increasingly serious in the Salinas valley, and caused by *Fusarium solani* f. *phaseoli* [**38**, 723], *Rhizoctonia* [*Corticium*] *solani* [**32**, 192, 531], and, early in the season, *Thielaviopsis basicola* [**26**, 476], was controlled with soil organic amendments of high C : N ratio, i.e. straw from mature barley, wheat, and maize, and pine shavings. The materials, 1% by wt. of dry soil, were added to field soil and incubated 10 days before sowing, damage being assayed after 4 weeks. Green barley hay, with high N, increased disease severity, as did addition of N with mature barley straw. Soybean and lucerne residues, with a low C : N, increased root rot.

Harrison (M. D.). **The variation among Fusarium spp. causing root rot of Beans in relation to temperature and host reaction.**—Abs. in *Publ. Univ. Wyoming*, **23**, 5, pp. 82–83, 1959.

In studies on 31 single-spore lines from 6 mass cultures micro- and macroconidial lines from the same mass culture of *F. solani* f. *phaseoli* displayed wide differences in pathogenicity and other characters. Physiologic races were demonstrated by the reaction of 9 bean [*Phaseolus vulgaris*] vars. to single spore lines.

Pickett (L. C.). **Chemical control of cortical root rot of dry Beans.**—Abs. in *Publ. Univ. Wyoming*, **23**, 5, p. 111, 1959.

In greenhouse experiments all treatments of beans [*Phaseolus vulgaris*] with vapam-4 S and U F-85 (formaldehyde-urea) gave almost complete control of cortical root rot (*Fusarium solani* f. *phaseoli*) [cf. above], though in field tests these materials failed to reduce infection.

Klement (Z.). **A Bab baktériumos betegségei Magyarországon. I. A kórokozók és gazdasági jelentőségük.** [Bacterial diseases of Bean in Hungary. I. Pathogenic agents and their economic significance.] *Növénytermelés*, **7**, 4, pp. 351–370, 9 fig., 1 map, 1958. [Russ., Engl. summ.]

The complex nature of the bacterial blight of beans [*Phaseolus vulgaris*] is confirmed by the Res. Inst. for Plant Protection, Budapest. Isolates obtained and shown to be pathogenic were *Corynebacterium flaccumfaciens* [**36**, 744], *Xanthomonas phaseoli* var. *fuscans* [**38**, 727], *X. phaseoli* [**36**, 744], and *Pseudomonas phaseolicola* [cf. **34**, 134], responsible, respectively, for 87·5, 9, 2, and 1·5% of the losses sustained in 1954–57. While *C. flaccumfaciens* and *X. p.* var. *fuscans* were noticed all over the country, the other 2 pathogens were reported only from the area delimited by the Danube and the Tisza.

Athow (K. L.) & Bancroft (J. B.). **Development and transmission of Tobacco ringspot virus in Soybean.** *Phytopathology*, **49**, 11, pp. 697–701, 1 graph, 1959. [18 ref.]

Studies at Purdue Univ., Lafayette, Ind., showed that early infection of Harosoy soybean plants (symptoms at 38 days) with tobacco ring spot virus [**37**, 387; **38**, 585] in a field where the disease had been severe the previous year resulted in plants less than ½ normal height, 41% barren plants, and an av. of 4 (mostly 1-seeded) pods and 1 g. seed/plant, i.e. a yield 6% of normal; later infection had proportionately less effect, though plants showing symptoms after 64 days still yielded only 40%. Seed transmission occurred from 78% of the plants showing symptoms at 38 days and 91% of the seeds on these were infected [cf. **33**, 699], the percentages decreasing the later infection occurred. The virus is associated with the embryonic tissue, but not with the seed coat. There was no evidence of soil transmission.

Insect transmission is considered probably responsible for spread; in 1958, when the disease was but little in evidence, none of the insects collected in the field proved capable of transmitting the virus from artificially infected plants. Incidence is correlated with the type of crop adjacent, infection being favoured by proximity to long established grass or weeds rather than to maize or a more recently established grass-legume mixture.

Threinen (J. T.), Kommedahl (T.), & Klug (R. J.). **Hybridization between radiation-induced mutants of two varieties of Diaporthe phaseolorum.**—*Phytopathology*, **49**, 12, pp. 797–801, 3 fig., 1959. [13 ref.]

At the Inst. Agric., Univ. Minn., St. Paul, ascospores, conidia, and hyphal tips in cultures of *D.p.* var. *caulivora* [**37**, 626; map 360] and var. *sojae* [**39**, 199] were irradiated with UV light (1–60 min.) or polonium 210 (30–120 min.) and non-sporulating mutants were obtained. Crossing mutants of var. *caulivora* with the parent type of var. *sojae* produced perithecia with the morphological characters of var. *sojae*, and containing ascospores resembling those of var. *caulivora*. Although growth of mutants varied on different media, self-sterility after irradiation did not appear due to nutrient deficiency. Self-sterile mutants of var. *caulivora* were heterothallic in crosses with both parent types, indicating that the homothallism ascribed to this var. is not constant.

In tests on Blackhawk soybeans only 1 mutant of var. *sojae* was as pathogenic as, or more so than, the parent type; no mutants of var. *caulivora* exceeded the parent in pathogenicity, and some produced symptoms of stem blight rather than stem canker. From the results obtained the distinction between these 2 vars. is considered to be invalid.

Grabe (D. F.) & Dunleavy (J.). **Physiologic specialization in Peronospora manshurica.**—*Phytopathology*, **49**, 12, pp. 791–793, 1 fig., 1959.

Further studies in Iowa [**39**, 204], using 14 soybean vars. as differentials, led to the discovery of 2 new races of this pathogen, no. 7 from Ill., which differs from 2 in failing to infect Richland, Norchief, and Laredo, and no. 8 [loc. cit.] from Ind., Mo., and Iowa, which is similar to race 2, but infects Pridesoy.

Vörös (J.) & Molnár (B.). **Peronospora manshurica (Naumoff) Sydow, a Szója uj kórokozója Magyarországon.** [*P. manshurica*, a new disease of Soybeans in Hungary.]—*Növénytermelés*, **7**, 4, pp. 371–374, 1958. [Russ., Engl., Germ. summ.]

A record [map 268] from the Res. Inst. for Plant Protection, Budapest. Bitter Kopf and Nagymagvú fehér were attacked severely and Korona and GM/1 moderately, whereas Szürke barát and Gigant were resistant. Early vars. were more prone to heavy damage than late ones.

Tasugi (H.) & Mogi (S.). **Resistance of Soybean leaves to the scab, caused by Sphaceloma glycines.**—*Ann. phytopath. Soc. Japan*, **23**, 4, pp. 159–164, 8 fig., 1958. [Jap. Abs. from Engl. summ. Received Nov. 1959.]

At Tohoku Univ., Sendai, when inoculated on to resistant soybean vars., *S. glycines* [**37**, 568] failed to produce lesions, which were numerous on susceptible vars.; young tissues proved more susceptible than older. The incubation period of the fungus is about 1 week and sporulation occurs 2 weeks after inoculation. When young and old leaves of resistant vars. are inoculated, only the epidermal cells become invaded and in mature leaves abnormal cell division takes place in the palisade layer under the infected epidermis, and eventually cork cambium is formed. On moderately resistant vars. the resistance of the tissues and lesion formation are affected by the environment and also by N fertilizer.

Uehara (K.). **On the phytoalexin production of the Soybean pod in reaction to Fusarium sp., the causal fungus of pod blight. 1. Some experiments on the phytoalexin production as affected by host plant conditions and on the nature of phytoalexin produced.** *Ann. phytopath. Soc. Japan*, **23**, 5, pp. 225–229, 1958. [Jap. Abs. from Engl. summ. Received Nov. 1959.]

At the Hiroshima agric. Coll., Saijo, Hiroshima Prefecture, the supernatant from drops of spore suspensions of *Fusarium* sp. [cf. **38**, 643] placed inside young, immature soybean pods and subsequently centrifuged, and tested for inhibitory action on germination of fresh *Fusarium* spores, contained more phytoalexin (PA) [**36**, 49; **37**, 645; **39**, 362] than the supernatant of a suspension placed inside mature pods. Production of PA by pods in contact with the spore suspension decreased sharply on the 2nd day, and sank almost to zero on the 4th day. The inhibitory activity of the PA in the diffusates was almost completely lost after heating to 100° C. for 5 min. or diluting to 1:8.

Cooper (W. E.) & Gregory (W. C.). **Radiation-induced leaf spot resistant mutants in the Peanut (Arachis hypogea L.).** *Agron. J.*, **52**, 1, pp. 1–4, 6 graphs, 1960.

Groundnut seed irradiated with X rays (10,000–18,500 r.) at the Dept Plant Path., N. Carol. agric. Exp. Sta., Raleigh, yielded X_2 and X_3 progenies with both decreased and increased resistance to leaf spot (*Mycosphaerella arachidicola* and *M. berkeleyii*) [cf. **36**, 448] under epiphytotic conditions, as indicated by the scores for leaf spot induced defoliation in field-grown populations. Selected entries compared in the following generations showed highly significant differences in the number and relative frequency of leaf spot lesions, numbers of leaves not defoliated, and in entry defoliation × disease control. Resistant lines were developed by selecting for defoliation resistance in the X_2 and X_3: with 2 exceptions, selections carried up to X_9 were stable for defoliation characteristics.

Garren (K. H.). **The stem rot of Peanuts and its control.**—*Tech. Bull. Va agric. Exp. Sta.* 144, 29 pp., 8 fig., 6 graphs, 1959. [39 ref.]

This publication, based on an extensive study of the disease of groundnuts in the U.S.A. caused by *Sclerotium rolfsii*, outlines the symptoms and describes various methods of control, most of which have been noticed [**39**, 205]. Deep covering of organic matter in the seed bed and care that soil is not thrown into the row of plants subsequently are the main recommendations.

Nawaz (M.) & Khan (I. U.). **Cercospora carotae (Pass.) Solheim on Carrot.**—*Biologia, Lahore*, **5**, 1, p. 46, 1959.

A new host record for W. Pakistan from Lyallpur agric. Coll.

Böhme (Hannelore). **Über die Ursachen der unterschiedlichen Resistenz von zwei Knollenselleriesorten gegenüber der Blattfleckenkrankheit (Septoria apii-graveolentis Dorogin).** [On the causes of the different resistance of two Celeriac varieties to the leaf spot disease (*S. apii-graveolentis*).]—*Phytopath. Z.*, **37**, 2, pp. 195–213, 1 fig., 4 graphs, 1959. [Engl. summ. 69 ref.]

Studies at the Inst. für Pflanzenzüchtung, Quedlinburg, Germany, showed that the intensity of fructification of *S. apii-graveolentis* [**36**, 541] on the very susceptible celeriac var. Invictus and the resistant Wiener Markt ran parallel to the degree of susceptibility. The difference in susceptibility was maintained in inoculations in the greenhouse. Young plants, regardless of var., were more susceptible than old ones. The reduction of sporulation on inoculated plants of Wiener Markt was expressed in a slight extension of the fructification time, a reduction in the number of pycnidia, and their smaller size; mycelial development was inhibited in the leaves, though spore germination and germ tube penetration and growth occurred

with the same speed and frequency on both vars. In culture on extracts of leaves and tubers from the 2 vars. prepared in different ways there were no differences in pycnidial formation corresponding to those on the host. Two highly aggressive strains of the fungus from Italy were capable of producing severe infections on Wiener Markt.

Solymosy (F.). **Effect of Tobacco and Cucumber mosaic viruses on the development of Red Pepper (Capsicum annuum L.).**—*Növénytermelés*, **3**, 2, pp. 109–120, 1958. [Abs. from *Hung. agric. Rev.*, **8**, 1, p. 5, 1959.]

Observations were made on *C. annuum* seedlings infected with tobacco mosaic virus (TMV) [cf. **35**, 507] and cucumber mosaic virus (CMV) [**39**, 143], individually or combined, at times when the plants bore (1) 6–8 leaves, (2) 12–14 leaves and the 1st flower buds, (3) 1st green fruit, and (4) 1st mature fruit. TMV alone or in combination with CMV produced necroses and killed the seedlings within a fortnight if infection occurred at (1). CMV depresses growth at all stages, and though TMV is not inhibitory, together they are more inhibitory the earlier infection occurs. Ripening is retarded by CMV at (1) and (2), and by TMV and the 2 viruses together at (2), with a check on flowering and budding. Except after CMV infection at (4), all infected plants gave fruit of normal length, but reduced in weight, though TMV alone does not increase loss of fruit weight on drying. Max. damage is done by CMV infection at (2), or by TMV alone or +CMV at (1).

Koomen (J. P.) et al. **Rond de teelt van Augurken.** [Concerning the cultivation of Gherkins.]—*Meded. Proefst. Groenteteelt Ned.* 14, 54 pp., 11 fig., 1 diag., 2 graphs, 1959. [Engl. summ.]

Chap. 4 and 5 (pp. 13–18, 19–28) are concerned, respectively, with varietal selection and diseases and pests, with emphasis on control. Protection against pre-emergence damage by *Rhizoctonia* [*Corticium*] *solani*, *Pythium* spp., and *Fusarium* spp. is conferred by seed treatment with various preparations of the thiram group used at 1 g./100 g. seed. The same fungi are responsible for damping-off, which may be combated by spraying with 100 g. Cu oxychloride/100 l. water, applied in different ways according to the mode of cultivation.

The importance of *Cladosporium cucumerinum* [**36**, 83] has been reduced to negligible proportions by the cultivation of races VI and VII of var. Baarlose Nietplekker, which are 90% resistant (Chap. 7, p. 46). The sole effective measure against *Pseudomonas lacrymans* [**34**, 510] is seed selection, discarding any from diseased fruits, but the risk of infection may be minimized by adequate crop rotation, while spraying at 10–14-day intervals with 250 g. Cu oxychloride/10 l. water appears to impede the spread of infection.

The occurrence of *Colletotrichum lagenarium* is very variable and localized [loc. cit.]. It may be responsible for heavy damage, especially in rainy seasons and in S. Netherlands; in 1953 and 1954 its effects were ruinous. Control measures comprise crop rotation, seed treatment with thiram (as against damping-off), and several applications at 10- to 14-day intervals of maneb (300 g./10 l. water), beginning as soon as symptoms are observed in the vicinity. The last-named treatment may be combined with an admixture of 50 g. karathane/10 l. for the control of *Erysiphe cichoracearum* (not to be used in strong sunlight).

In the Roelofsarendsveen centre of gherkin cultivation *Fusarium* spp. are prevalent and sometimes destructive; elsewhere their incidence is sporadic. They may persist in infected soil for at least 8 yr., but crop rotation is impracticable in areas of intensive culture and soil sterilization too costly; the most effective control measure is grafting on resistant stocks [**33**, 335]. *Verticillium* spp., which unlike *F.* spp. do not affect the roots, are only occasionally observed. Late potatoes should not precede gherkins in the rotation scheme.

Cucumber mosaic virus [**34**, 282] predominates in the Venlo region of Limburg, but of late years it has also been on the increase elsewhere, notably in the Beemster. Crop reductions from this source may amount to 75%. The symptoms and mode of transmission of the virosis are described in some detail. Direct control measures are unknown but the cultivation of the resistant var. Guntruud is recommended in districts where the disease is rife. It was developed by F. Tjallingii from the F_2 of a cross between Tokyo Long and Baarlose Nietplekker.

Liem (S. N.). **Cucumis virus 2 in Nederland.** [*Cucumis* virus 2 in the Netherlands.] —*Tijdschr. PlZiekt.*, **65**, 4, pp. 158–160, 1 pl., 1 graph, 1959. [Engl. summ.]

At the Laboratorium voor Virologie, Wageningen, samples of *Cucumis* virus 2 [cucumber green mottle mosaic virus] from Dutch sources, in cucumber sap, were found to have the physical characteristics (thermal inactivation point, dilution end point, and rod length) given for this virus in the literature [cf. **14**, 811; **37**, 751].

Komuro (Y.). **Studies on Cucumber mosaic virus. III. Host range.**—*Ann. phytopath. Soc. Japan*, **23**, 5, pp. 235–239, 1958. [Jap. Abstr. from Engl. summ. Received Nov. 1959.]

In further studies at Nagoya Univ., Anzyo [cf. **35**, 862], of 260 spp. (74 fam.) tested, plants of 117 spp. (39 fam.) were infected by cucumber mosaic virus and local lesions were produced on leaves of plants in 20 spp. (9 fam.); 45 spp. and vars. (listed), not recorded previously as hosts (including *Papaver orientale* listed as a non-host in U.S.A.), were infected while 11 spp. (listed) previously regarded as susceptible gave negative results. It is considered that there are many strs. of the virus which differ in host range and in symptom expression on certain host plants.

Kajiwara (T.) & Iwata (Y.). **On the diurnal cycle of Cucumber downy mildew and on the effect of light upon sporulation.**—*Ann. phytopath. Soc. Japan*, **24**, 2, pp. 109–113, 1 fig., 1959. [Jap. Abs. from Engl. summ.]

At the National Inst. agric. Sci., Nishigahara, Tokyo, cucumber leaves infected with mildew (*Pseudoperonospora cubensis* [**37**, 752]) were removed every 3 hr. from 6 a.m. to 3 a.m. the next day from greenhouse plants, washed to remove conidiophores, dried, cut, and placed in moist chambers either: (*a*) in total darkness at 23° C., (*b*) exposed at the same temp. to fluorescent light at 300 lux, or (*c*) exposed to tungsten light at 4000 lux at 23·6–24·2°. In (*a*) conidial production started within 3–12 hr., regardless of when the leaves were detached, but the sporulation time was shortest (3 hr.) in leaves sampled at 12 p.m., and longest (12 hr.) in those collected at 9 a.m. and 12 a.m. In (*b*) abundant conidia were formed after 3 hr. on leaves collected at 12 p.m., and after 9 12 hr. on leaves collected at 3 p.m., 6 p.m., and 3 a.m., which also formed a few more conidia within a further 6 hr. On leaves detached from 6–12 a.m. long slender conidiophores formed after 15 -18 hr., with no further conidia forming subsequently. Conidial production in (*c*) was similar to (*b*), except that conidial production was lower on leaves sampled at 9 p.m. and 12 p.m. Although not studied, a diurnal cycle for conidial production in nature is indicated. It is concluded that darkness is favourable but not indispensable to sporulation, light may sometimes suppress it, and alternating light and darkness may be responsible for diurnal periodicity, by indirect effect through the host.

Nishimura (S.). **Pathochemical studies on Watermelon wilt. (Part 10). On the metabolic products of Fusarium oxysporum f. niveum (E.F.S.) Snyder et Hansen. (2) ; (Part 11). Observations on the fusaric acid production of the fungi of the genus Fusarium. (Supplementary report) ; (Part 12). Isolation of phenolic substances causing the vascular discoloration.**—*Ann. phytopath. Soc. Japan*,

23, 4, pp. 176–180, 4 graphs; 5, pp. 210–214, 1958; **24**, 3, pp. 139–144, 2 fig., 5 graphs, 1959. [Jap. Abs. from Engl. summ.]

In further studies (at the Faculty Agric., Tottori Univ.) [cf. **37**, 753], polysaccharide, nitrite, and ethanol, toxic to host plants, were detected in the culture filtrate of *F. o.* f. *niveum* but not in sufficient amounts to account for their importance in disease development. During conidial germination, depolymerase and cellulase, both causing breakdown of host cell walls, were produced, followed by the production of fusaric acid and phytonivein, both toxic to living cells. It is suggested that these toxins promote disease development and systemic wilt symptoms.

In part 11 it is noted that all strains of *F. oxysporum* and *F. moniliforme* [*Gibberella fujikuroi*: cf. **37**, 763] can produce fusaric acid, a factor which distinguishes them from Snyder and Hansen's 6 other *F.* spp., from strs. of related *Nectria* and *Epicoccum*, and from other wilt producing fungi (*Cephalosporium* and *Verticillium*), and which could be employed in the classification of *F.* The strs. producing the max. fusaric acid need not be the most pathogenic.

Browning of tissues (part 12) infected by *F. o.* f. *niveum* was limited in the early stages to the xylem parenchyma, where also an increase of phenolic substances and abnormal activation of phenoloxidase occurred. Although tissue browning preceded the invading hyphae, it did not form a chemical barrier to the advancing fungus, mycelium of which was later found growing in the discoloured cells. The qualitative and quantitative changes in salicylic acid and other phenolic substances isolated from roots as precursors of browning were studied in the tissues during disease development with the spectrophotometer and by paper electrophoresis. The antibiotic action of salicylic acid on the causal fungus was dependent on the COOH radical rather than the OH. Fungus pectic enzyme and fusaric acid might be indirectly responsible for the browning *in vivo*.

Matuo (T.) & Ishigami (K.). **On the wilt of Solanum melongena L. and its causal fungus Fusarium oxysporum f. melongenae n.f.**—*Ann. phytopath. Soc. Japan*, **23**, 4, pp. 189–192, 3 fig., 1958. [Japan. Abs. from Engl. summ. Received Nov. 1959.]

At Shinshu Univ., Ueda, the str. causing eggplant wilt was pathogenic to other Solanaceae, while other forms from various solanaceous hosts did not attack eggplant. The name *F. o.* f. *melongenae* Matuo & Ishigami is therefore proposed for this pathogen.

Jackson (C. R.). **Symptoms and host-parasite relations of the Alternaria leafspot disease of cucurbits.**—*Phytopathology*, **49**, 11, pp. 731–733, 1959.

A fuller account of information on *A. cucumerina* from the Gulf Coast Exp. Sta., Univ. Fla, Bradenton [**38**, 494].

Dzhafarov (S. A.). Азәрбајчанда Үзүм хәстәликләри һаггында илк мә' лумат. [The earliest information on diseases of the Vine in Azerbaijan.]—Докл. Акад. Наук Азерб. ССР [*Dokl. Akad. Nauk Azerb. S.S.R.*], **15**, 8, pp. 751–754, 1 fig., 1959. [Russ. summ.]

When examining the literature on the mycoflora of the Taluish in Leningrad, a brochure was found written by S. Z. Bashinjagiyan (10 pp., published Baku, 1916) in Azeri Turkish on mildew [*Plasmopara viticola*: map 221] and oidium [*Uncinula necator*] in Azerbaijan, where they were known in the Baku guberniya and Daghestan as early as 1870. From 1880 they caused great damage to the viticulture of the region. Control measures were recommended.

Ochs (Gertrud). **Eine Methode, viele Weinreben für Fragen der Mittelprüfung oder Resistenz gleichmässig mit Pseudopeziza tracheïphila zu infizieren.** [A

method of producing standard *P. tracheiphila* infection of Vine for fungicide or resistance tests.] —*Schweiz. Z. Pilzk.*, **58**, 1, pp. 8–9, 1960. [Engl. summ.]

In further experiments [cf. **37**, 131] at the Botanisches Institut, Univ. Freiburg-im-Breisgau, Germany, mycelial fragments of *P. tracheiphila* [**38**, 347] were cultured for 10–14 days in carrot sap or Hoagland and Czapek solutions and sprayed on vine seedlings in damp air at not exceeding 25° C. Seedlings were invariably affected, there being 10 times more infection on the lower side of the leaves than on the upper.

Chiarappa (L.). **The root rot complex of Vitis vinifera in California.** *Phytopathology*, **49**, 10, pp. 670–674, 6 fig., 1959.

In further studies at Univ. Calif., Davis [**39**, 260], 1,131 isolates, of which more than half were pythiaceous, were obtained from roots and soil associated with a decline in irrigated vineyards in the San Joaquin valley. The foliage becomes sparse and yellowed, little fruit is produced, and abundant necrosis of large roots, abnormal branching, and reduction of feeder roots is evident, especially in vines on their own roots. In sand culture experiments 6 *Phytophthora* spp., 1 *Pythium* sp., and 2 unidentified fungi caused root decay and stunting of young vines; 2 *Phytophthora* spp., 1 *Pythium* sp., 1 *Rhizoctonia* sp., and 2 unidentified fungi caused stunting without root decay. There was a difference in the virulence of 2 *P. ultimum* isolates to Carignane vines, and the rootstock Othello × Solenis no. 1613 appeared to be resistant to root decay caused by *P. ultimum* and *Rhizoctonia* sp.

Pine (T. S.). **Development of the Grape dead-arm disease.** *Phytopathology*, **49**, 11, pp. 738–743, 6 fig., 1959.

In further studies at Univ. Calif., Davis [**37**, 696], the initial symptom of dead-arm, (*Phomopsis* [*Cryptosporella*] *viticola*) was found to be a spotting of new leaves, often coalescing and necrotic, leading to deformation and chlorosis. Generally only 6–8 basal nodes of new shoots are affected; suckering at the base of spurs killed by the pathogen makes the plant bushy. About a month after the beginning of spring, growth lesions, some bearing pycnidia, appear on canes, petioles, tendrils, and clusters. In wet conditions berries may be infected before harvest.

The primary sources of inoculum are the pycnidia on spurs and clusters left on dormant vines. Rains spread the spores in spring to unfolded buds, entry occurring via wounds, such as insect damage or broken hairs on the leaf surface, and probably also directly through stomata. In addition, the disease spreads slowly within the host. Complete girdling of shoots by the extension of corky abrasions on the surface result in the 'dead arm' condition. No European vine var. in Calif. appeared to be resistant [cf. **38**, 121, 177].

Shterenberg (P. M.). О природе пятнистого некроза. [On the nature of spotted necrosis.]—*Vitic. and Wine-Mak., Moscow*, **19**, 7, pp. 28–33, 1959.

In studies at the V. E. Tairov Ukrainian Sci. Res. Inst. for Viticulture and Wine-making the causal agent of spotted necrosis [**38**, 444], a comparatively new disease causing considerable losses in recent yr. in the vineyards and nurseries of the Ukraine and Moldavia, was determined as *Rhacodiella* [*Sclerotinia pseudotuberosa*: **38**, 630] on the basis of inoculation with a culture of *S. pseudotuberosa* isolated from infected tissues and re-isolation. Inoculation of scions produced 71% infection, and of diseased wood 67%. Infection at room temp. and at 8–11° C. was not so strong as at 2–4°, though the fungus developed well on the surface of the scions. The shoots become infected mainly during the winter resting period when the min. temp. for the development of the fungus is lower than the min. for the reaction of the plant. Kaberne Sovin'on, Senso, Chinuri, Rakatsiteli, and Gars Levelyu were noticeably resistant. On several nursery farms it was found that if stocks

were not interlayered in storage and were kept in medium humidity the development of the diseases was significantly held in check.

Korobkina (Mme Z. V.) & Kochurova (Mme A. I.). Использование метабисульфита калия против плесневых грибков. [The use of potassium metabisulphite against mould fungi.]—*Vitic. & Wine-Mak., Moscow*, **19**, 8, pp. 28–30, 1959.

The authors, associated with the Soviet and Co-operative Inst. of Commerce, Samarkand, U.S.S.R., and the Inst. of Nat. Economy, Moscow, respectively, report that mould on packed or stored grapes, mostly *Penicillium glaucum* [cf. **31**, 28] but also spp. of *Mucor*, *Botrytis*, *Aspergillus*, *Alternaria* [cf. **38**, 308], *Rhizopus*, *Cladosporium* [**38**, 308], and *Syncephalastrum*, was effectively controlled by $K_2S_2O_5$, which gave better results than solutions of orthophenylphenol, diphenyl, and IKI. Grapes kept at 0–3° C. for 4½ months normally developed 79–82% decay and 18–20% droppage, but were rated at 3–4·3% and 4·9–6·2%, respectively, in the same conditions $+K_2S_2O_5$. Commercial dosage was 20 g. mixed with 800 g. of cork filings used in packing 7–8 kg. boxes, or 1·5 g. per paper bag containing 800 g. of grapes; with lower rates the preservative effect decreased. In agar cultures covered with a paper soaked in $K_2S_2O_5$ solution, growth was prevented at 25% and above.

Dobrolyubskiĭ (O. K.). Микроэлемент ртуть как фактор воздействия на растительные организмы. [Mercury as a trace element affecting plant organisms.] —*C.R. Acad. Sci. U.S.S.R.*, **128**, 5, pp. 1080–1083, 1959.

In 1958 Aligote vines at the 'Chervoniĭ Khutor' farm were sprayed twice with $8{\cdot}4 \times 10^{-8}$ $HgSO_4$ solution (or water sprayed) at flowering and 3 weeks later, which deposited an av. of 5×10^{-6} g. salt on the plant. A few days before harvest (19 Sept.) samples were assayed at the Odessa agric. Inst.

Wt./100 grapes was increased from 101·2 g. (water sprayed) to 136·2 g., sugar content from 15·25 to 18·3%, acidity was less, and ripening accelerated. The effects on the physiological processes concerned were investigated and are discussed. In particular catalase activity in the leaves and the oxidizing-reducing and invertase processes in berries were increased and prolonged.

Green (D. E.) & Brooks (Audrey V.). **Notes from Wisley.**—*J.R. hort. Soc.*, **84**, 12, pp. 528–530, 1959.

This brief conspectus based on enquiries addressed to the Mycol. Dept, R.H.S. Garden, Wisley, Surrey, in 1959 is primarily concerned with the occurrence of parasites, which were fewer than in recent years owing to the drought. Of powdery mildews, which seem to have been encouraged by the dryness at the roots, strawberry mildew (*Sphaerotheca humuli*) [**37**, 545] was the most common fruit disease at the beginning of summer. Rusts, with exception of *Puccinia* [*Tranzchelia*] *prunispinosae* [cf. **35**, 108], common on plum leaves, were relatively rare, though some unusual kinds were recorded, such as *P. buxi* [cf. **37**, 399] on box and *Uromyces phaseolorum* [*U. appendiculatus*: map 290] on runner beans [*Phaseolus coccineus*]. There was a surprisingly great amount of peony wilt (*Botrytis paeoniae*) [**31**, 491].

Phillips (D. H.). **Report of the Mycological Department, 1958.**—*Rep. States Jersey, 1958*, pp. 45–62, 1959.

New records in this report [cf. **38**, 238] include black leg (*Bacterium phytophthorum*) [*Erwinia atroseptica*: cf. **39**, 37] affecting the potato vars. Ulster Chieftain, Ulster Premier, and Ulster Prince in experimental plots; downy mildew (*Plasmopara nivea*) [cf. **34**, 323] on carrot; powdery mildew (? *Erysiphe polygoni*) in the *Oidium* state on anemone; *O. dianthi* on carnation; and a mosaic of shallot, with symptoms

resembling those of shallot yellows virus [onion yellow dwarf virus]. *Exobasidium vaccinii* on rhododendron was observed for the 1st time since 1933.

Race 21 of *Puccinia graminis* [**37**, 5] was identified on differential vars. of spring wheat in an experimental plot. The commonly grown early potato Jersey Royal (str. of International Kidney) is field-immune from potato viruses X and A [**35**, 37] and nearly all stocks are protected from the virulent strs. of potato virus Y [**38**, 651] by the presence in them of virus C [str. of Y: loc. cit.], which produces little apparent effect on this var.; symptoms of leaf roll virus [**38**, 329] were rarely noted. There were 2 reports of *Physarum cinereum* forming round, greasy-looking spots on lawns. Stem rot (*Didymella lycopersici*) [**39**, 50] and blight (*Phytophthora infestans*) [**37**, 5] on tomato were effectively controlled by zineb and maneb, the wet summer favouring heavy infection by blight (also on potato) and by *Botrytis cinerea*.

Åkerberg (E.). **Årsberättelse över Sveriges Utsädesforenings verksamhet år 1958.** [Annual report on the work of the Swedish Seed Association for the year 1958.] —*Sverig. Utsädesforen. Tidskr.*, **69**, 3, pp. 127–213, 1 graph, 1959.

In accordance with recent practice this report was compiled by the Director in collaboration with the heads of departments at the headquarters (Svalöf) of the Association and its various branches [cf. **37**, 699]. Items of phytopathological interest include the following. At the Västernorrland branch winter wheat was severely attacked by *Fusarium* [*Calonectria nivalis*] and to a lesser extent by *Typhula* and *Sclerotinia* spp. The total crop reductions from fungal infection were estimated at 60–70% in susceptible and 25–30% in resistant vars. At an experimental farm at Öland, a substation of the Kalmar branch, the winter wheat crop was a virtual failure on account of persistent snow and heavy infection by *C. nivalis*. There were clear-cut varietal differences in the reaction of winter barley to parasitic fungi, notably *T.* spp. and *C. nivalis*. As usual, these spp. were responsible for heavy damage to rye and pasture grasses at the Övrenorrland branches. Excellent control of the pathogens on rye was secured by 3 applications (5, 10 Oct., 9 Nov.) of brassicol super konc. At Ultuna oats were severely attacked by crown rust [*Puccinia coronata*: **39**, 292], especially the early-ripening Å 01680 and Blixt. Reductions in 1,000-seed weights ranged from 15 to 20%. The disease was also troublesome in the Orebro district.

The red clover vars. Merkur and Hermes showed their usual high degree of resistance to rot [*S. trifoliorum*], while the tetraploid strs. in general were also outstanding in this respect.

Polyspora lini was prevalent among spinning flax selections, especially those in which the N. American var. Cascade, resistant to *Melampsora lini*, was a parent. *Botrytis cinerea*, which was widespread during 1958 on var. Wiera in Belgium, Netherlands, Denmark, and parts of Sweden, did not occur at Svalöf. In this connexion it was observed at an experimental institute in N. Holland that the Svalöf lines 0261b, 0232, 52/66, 54/1057, and 0222 were highly resistant to *B. cinerea* as well as to *Ascochyta lini* (especially Sv 54/1057).

Production of turnips and swedes at the Värmland branch was substantially reduced by club root [*Plasmodiophora brassicae*], but 2 vars. of each were highly resistant and prolific, viz. Svalöfs Vilhelmsburger and Hammenhögs Vilhelmsburger Patria turnips, and Yellow Tankard and Gröntöppig 4n swedes.

Potato blight (*Phytophthora* [*infestans*]) was also widespread at the same station but the haulms were destroyed at an early stage. Tuber rot, however, was frequent in vars. Rosen and Early Puritan. At Kalmar 5 selections proved highly resistant, while Anna gave the highest yields among the commercial vars., followed by Ackersegen; the normally productive Bintje and Up-to-Date shrivelled at an early stage on account of infection.

Simmonds (J. H.). **Science Branch, Plant Pathology Section.**—*Rep. Dep. Agric. Qd, 1958–59*, pp. 49–50, 1959.

This report [cf. **38**, 296] notes that in general the issues of disease resistance and avoidance were given more attention than those of fungicides. Wheat crops incurred serious damage from a new physiological race of stem rust [*Puccinia graminis*: **39**, 297], only vars. Spica, Lawrence, and Festival showing good resistance. High incidence of frost damage favoured crown rot (*Fusarium graminearum*) [**35**, 877] in all cereals. *Ustilago bullata* considerably affected prairie grass (*Bromus catharticus*); kernel smut (*Sphacelotheca sorghi*) on sorghum, studied both *in vivo* and *in vitro*, appeared to be associated with soil N content. Maize in N. Queensland suffered from rust epidemics, incited either by the normal Queensland maize rust (*Puccinia sorghi*) [cf. **37**, 133] or by a newly introduced str.

Stem rot caused by *Sclerotium rolfsii* widely infested groundnuts [**33**, 210], but caused no heavy losses. Ginger rhizome rot (*Fusarium oxysporum*) was best controlled by 10 min. immersions in 2 lb./40 gal. of standard mercurials; higher conc. provoked abnormal shooting.

Gloeosporium sp., normally responsible for strawberry fruit rot [**38**, 21], was able to infect the stigmas and prevent fertilization. A sp. of *Mycosphaerella*, probably *M. musae* [cf. **8**, 25], was confirmed to be the causal agent of leaf speckle on banana.

Root rot in pine trees was associated with *Phytophthora cinnamomi*, which with *Pythium ultimum* and *Rhizoctonia* [*Corticium*] *solani* [cf. **38**, 491] caused damping-off of *Pinus radiata* seedlings.

New or interesting records include crown and root rot (*Phytophthora parasitica*) of lucerne; root rot (*P. parasitica* and *P. cinnamomi*) of passion fruit; *Marasmius* root rot of banana; leaf and pod spot (*Pleiochaeta setosa*) [map 243] on beans [*Phaseolus vulgaris*]; lettuce big vein (*Olpidium brassicae*) [cf. **37**, 620]; corm rot (*Curvularia lunata*) of gladiolus [cf. **35**, 512]; *Cylindrocladium scoparium* on roses [cf. **34**, 138]; fruit rot (*Mycosphaerella melonis*) of melon; bacterial wilt (*Pseudomonas solanaceum*) of French bean; and bacterial fruit spot (*Xanthomonas cucurbitae*) [cf. **9**, 576] of vegetable marrow.

Vasudeva (R. S.). **Report of the Division of Mycology and Plant Pathology.** –*Sci. Rep. agric. Res. Inst. N. Delhi, 1956–1957*, pp. 86–100, 1958. [Received Jan. 1960.]

Some data in this report [cf. **39**, 73] have been noticed. In the section of Plant Pathology (pp. 86–93) it is noted that *Puccinia graminis* race 17, hitherto unrecorded in India, was isolated from 2 samples of wheat collected from the 1954 crop in Lahaul valley, Punjab. Indications of a new race of brown rust (*P. triticina*) [*P. recondita*] resembling 162 were also obtained, while race 70 was again found in the Punjab. Races 42–B, 21, and 40 of *P. graminis*, 20 and 63 of *P. recondita*, and 19 and A of yellow rust (*P. glumarum*) [*P. striiformis*] were predominant and widely distributed, whereas the virulent race 122 of *P. graminis* was not met with for the 2nd successive yr. Further evidence of over-summering of *P. striiformis* on *Muehlenbergia hugelii* in Himachal Pradesh was obtained. *Aegilops bicornis*, *A. triaristata*, *A. ovata*, and *A. squarrosa* were susceptible to the 3 rusts of wheat but immune from *P. graminis* from oats, to which *Phalaris canariensis*, *Avena glauca*, and *Agropyron triticeum* were susceptible, the last being also susceptible to black and yellow rusts of wheat. *Aegilops caudata* was susceptible to some races of the 3 wheat rusts and resistant to others. Wheat var. P.D. 14 was resistant to all races of *P. striiformis* except 31. *P. hordei*, hitherto considered rare on barley in India, was found at several places in Madras, U.P., and Delhi State.

P. kuehnii [**38**, 33] was maintained on cut leaves of sugarcane for 7 successive generations. The opt. temp. for uredospore germination in water was 18–25° C.

and for teleutospores 18–22°. The rusts from *Saccharum spontaneum* and sugarcane were cross-inoculable and the latter was also infected by the rust from *Erianthus fulvus*.

Pigeon pea var. S. 55 did not develop wilt (*Fusarium udum*) in the field, though it developed 5·3% infection in pots.

Isolate 244 of *Colletotrichum falcatum* [*Glomerella tucumanensis*: **39**, 192] was more virulent on sugarcane than the dark, sparsely sporulating No. 78. A dose of Browns' synthetic medium before inoculation enhanced the parasitic activity of the isolates, the N apparently being chiefly responsible.

Further studies on the etiological relationship between *Corynebacterium tritici*, causing yellow ear rot ('tundu disease') of wheat, and the nematode *Anguina tritici* suggest that the latter probably functions as a vector, transporting the bacterium to the otherwise inaccessible meristematic regions of the plants. There is evidence that *C. tritici* may sometimes be able to survive in soil, as the bacterial disease may be found in the absence of the nematode.

In host range studies of *Xanthomonas vesicatoria* from chilli (*Capsicum* sp.) [map 269: cf. **29**, 406] on 24 plant spp. of different families it attacked only tomato and chilli. All 26 chilli var. tested were susceptible. The pathogen survived in diseased leaves for 5 months, in sterilized soil up to 4½ months, and in unsterilized soil for 15 days; seed was the main source of primary infection.

In the cultivation of edible mushrooms (*Volvaria volvacea*) under Delhi conditions watering the beds twice a day, 86–95° F., and application of gram [*Cicer arietinum*] –'arhar' flour favoured production. Buttons appeared 16–18 days after spawning, and fully matured mushrooms within the next 1–2 days. *V. volvacea* gave a higher yield than *V. diplasia*.

In the section on plant viruses (pp. 94–98) it is noted that *Myzus persicae* proved an additional vector of chilli mosaic virus [str. of lucerne mosaic virus] causing mosaic and leaf curl of chilli.

Brinjal [eggplant] mosaic [**39**, 74] was found to be caused by a complex of 2 viruses, 1 of which produced systemic mosaic symptoms and the other local necrotic lesions in *Nicotiana glutinosa*. The virus was transmitted to *N. grandiflora*, *N. affinis*, and *Physalis floridana* by sap inoculation.

All the *Gossypium barbadense* and *G. hirsutum* vars. as also 8 Indo-American hybrid cottons were immune from cotton small-leaf [virus] disease [**35**, 280, 281].

'Grassy shoot' disease [**36**, 212] was successfully transmitted to healthy Co. 419 sugarcane setts by a contaminated cutting knife and by sap inoculation of the cut ends of the setts by the pinprick method. The virus could not be eliminated from diseased setts by hot water treatment at 122° F. for 2 hr. and setts treated thus for 4 hr. or at 125·6° for 1 hr. failed to germinate.

A severe mosaic disease of broad bean collected from Kulu Valley was transmitted by sap inoculation and by 3 aphid spp., *M. persicae*, *Aphis laburni*, and *Macrosiphoniella sanborni*. The dilution end point of the virus was 1 : 1,000–1 : 5,000 and it survived at 42·8–59° F. *in vitro* for 120 but not for 144 hr.

The concluding section on systematic mycology and the programme of future work are on the usual lines.

Plant Pathology Division.—*Rep. Dep. Agric. Mauritius, 1958*, pp. 38–40, 1959.

Some of the information in this report [cf. **38**, 657] has been noticed [**38**, 373]. *Leveillula taurica*, grey leaf spot (*Stemphylium solani*) [map 333], and fruit rots caused by *Phoma destructiva* [map 324] and *Pleospora herbarum* were new records on tomato for Mauritius. *S. solani* leaf spot was a new record for *Pelargonium*.

Also recorded for the 1st time in Mauritius were: *Pestalotiopsis brevitesa* on *Anthurium andreanum*; *Alternaria dauci* on carrot; *Microdiplodia microsporella* on *Eucalyptus* sp.; *Cercospora unamunoi* on green pepper [*Capsicum* sp.]; *Septoria*

gypsophilae and *A. tenuissima* on *Gypsophila*; *Cercospora althacina* on hollyhock; *C. malayensis* on *Hibiscus esculentus*; *Diplodia natalensis* on mango; *C. petuniae* on petunia, *Mycosphaerella rosigena* var. *madagascariensis* on rose; *Phyllosticta hortorum* on *Solanum auriculatum*; *Periconia byssoides* on sweet potato leaves and stems; *Xylobotryum dussi* on tea roots; *Helminthosporum rostratum*, *P. byssoides*, and *Sporodesmium bakeri* on tobacco leaves; *Dendrophoma obscurans* on strawberry; and *Glomerella vanillae* on vanilla.

Fernández Valiela (M. V.). **Plant pests and diseases of economic importance in the Paraná Delta, Argentina.**—*F.A.O. Pl. Prot. Bull.*, **7**, 10, pp. 129–133, 1 map, 1959.

This further report from the Estación exp. del Delta, Inst. nac. de Tecnologia agropecuaria, Campana, Province of Buenos Aires, Argentina [cf. **35**, 772], notes that only *Fusarium lateritium* [*Gibberella lateritia*] was found to be associated with the fatal wood necrosis of plum trees reported earlier [**35**, 617]. Bacterial spot of plum (*Xanthomonas pruni*) [map 340] can become serious on the Cristal, Ferrara, and Wickson vars. Citrus gummosis (*Phytophthora* sp.) [cf. **38**, 691] is most frequent and severe on lemon, being only sporadic on other citrus spp. Scab (*Sphaceloma fawcetti* var. *viscosa* [*Elsinoe australis*]) [cf. **20**, 460] attacks mandarin chiefly and, to a less extent, oranges and lemons. *Marssonina salicicola* [**38**, 549] causes premature defoliation of *Salix alba* var. *calva*, and *M. kriegeriana* attacks *S. babylonica* and *S. argentinensis* f. *hibrido*, but the injury caused is less important.

Rapport annuel pour l'exercice 1958. [Annual report for the year 1958.]—*Publ. Inst. nat. agron. Congo belge, 1959* (hors sér.), 529 pp., 1 map, 1959. 160 Fr.

In the section of this report [cf. **38**, 382] dealing with the work of the Div. of Phytopath. and Entom., Central Lab., Yangambi Res. Sta. (pp. 94–104), it is recommended that during the period of regeneration of rubber foliage S applications against *Oidium* [*heveae*: **38**, 542] at 12–15 kg./ha. should be made at least 4 times at weekly intervals. Experiments demonstrated that in treating rice seed with a product containing 1·5% Hg as phenyl mercuric acetate, 0·2% should not be exceeded; treatment should be given not more than 2 or 3 months before sowing.

In an ascent of Ruwenzori it was found that in the equatorial area the limit of altitude of *Fomes lignosus* is about 1,300 m., *Rosellinia* (probably *R. necatrix*) is found at 1,300 m. and over, and *Armillaria mellea* was observed at all altitudes up to 3,500 m.

Against haricot bean [*Phaseolus vulgaris*] diseases in the Kivu sector, Mulungu-Tshibinda Res. Sta. (p. 428), 3 applications/week, starting 21 days after seeding, of a wettable dust containing 65% zineb and applied at 0·5%+an adhesive (0·2%) gave satisfactory control of *Uromyces appendiculatus*, *Ascochyta phaseolorum*, and *Phytophthora phaseoli* [**19**, 330] on the Ibundu var.

At the Regional phytopath. Lab., Ruanda-Urundi Sector (pp. 491–3), isolation of *Colletotrichum coffeanum* [*Glomerella cingulata*: cf. **34**, 583] in pure culture was continued. Inoculation experiments demonstrated that susceptibility to attack depends on physiological factors.

Annual Report of the National Institute of Genetics, Japan, 9, 1958.—144 pp., 6 fig., 4 diag., 8 graphs, 1 map, 1959.

In studies by K. Katsuya (pp. 48–49) 14 strs. of 9 wild *Oryza* spp. together with 10 foreign strs. and 3 Japanese vars. of cultivated rice were tested against 2 strs. of *Piricularia oryzae* [**38**, 142]. *O.* ? *officinalis* (W 0012), *O.* ? *eichingeri* (W 0015), *O. latifolia* (W 0019), and *O.* ? *breviligulata* (W 0028) were resistant to str. P-2 when sprayed with a spore suspension, resistant or moderately susceptible when the suspension was injected into the folded leaves, and resistant when injected with

str. 54–04. *O. subulata* (W 0510) was moderately susceptible to P-2 and resistant to 54–04. *O. australiensis* (W 0008) was highly susceptible to both strs.

Inoculation of normal Einkorn wheat and its chlorophyll mutants (pp. 49–50) demonstrated susceptibility to *Puccinia graminis* f. sp. *tritici* str. 17 and resistance or moderate resistance to *P. triticina* [*P. recondita*] 21 B [**39**, 98] in normal plants and the 'chlorina' mutant; susceptibility to *P. graminis* in 'basi-viridis II'; susceptibility to *P. graminis* and susceptibility or moderate resistance to *P. recondita* in 'virido-albina', and resistance to both rusts in 'albina'.

Y. Takenaka describes (pp. 50–51) cytogenic studies of *Nicotiana* in which 2 of the hybrids used were tobacco × *N. benavidesii*, produced to incorporate in tobacco the genes for immunity from common [tobacco] mosaic [virus: **35**, 128] present in *N. benavidesii*, and tobacco × *N. langsdorfii*, resistant to mildew [*Erysiphe cichoracearum*: **32**, 466] and black root rot [*Thielaviopsis basicola*].

Hsiang (W. N.). **Contributions to Chinese Mycology and Phytopathology.**—323 +3—x pp., Pekin, Science Press, 1957. [Chinese. Received Jan. 1960.] 2 Yuan; 12*s*. 6*d*.

This compilation, intended as a reference book to the contributions of Chinese scientists in these fields for 1914–55, lists some 2,600 papers. Abstracts are given of 670, either older papers or those published outside China. There are 2 sections: Mycology (pp. 1–64) and Phytopathology (pp. 65–323). The mycological entries are grouped under: 1. Fungi (pp. 1–41) —records for China (all groups); 2. Morphology (p. 41); 3. Physiology (pp. 41–48); 4. Soil fungi (pp. 48–50); 5. Industrial fungi (pp. 50–57); 6. Edible fungi (pp. 57–62), and 7. Varia (pp. 62–64). Contributions in the plant pathology section are: 1. General surveys of plant diseases (pp. 65–67); 2. Non-infectious plant diseases (pp. 65–69); 3. Plant viruses and virus diseases (pp. 69–71); 4. Plant bacteria and bacterial diseases (p. 71); 5. Parasitic spermatophytes (pp. 71–72); 6. Insect parasites of roots (p. 73); 7. The biological character of parasitism, the external environment and plant diseases (pp. 73–74); 8. Parasite-host relationships (pp. 74–77); 9. Antagonistic microbial action, the use of antibiotic fungi for plant disease control (pp. 77–80); 10. Plant disease control methods (pp. 80–101); 11. Phytopathological research methods and techniques (pp. 101–105); 12. Investigations of plant diseases in China (pp. 105–120); 13. Diseases of general crops, viz., rice, cereals, wheat, barley, oats, millet, kaoliang, maize, sweet potato, potato (pp. 121–224); and 14. Diseases of special crops, cotton, hemp, soybean, groundnuts, sugarcane and sugar beet, tobacco, tea, mulberry (pp. 224–257); 15. Fruit trees, including citrus and tropical fruits (pp. 257–287); 16. Vegetables (pp. 287–308); 17. Ornamentals and officinal plants (p. 309); 18. Fodders (p. 309); 19. Trees (pp. 309–314); 20. Timber (p. 314); 21. Other plants (p. 315); 22. Miscellaneous (pp. 315–323).

Kamat (M. N.). **Hand-book of mycology. Part I. Phycomycetes and Ascomycetes.** —iv+185 pp., 51 pl., 13 fig., Poona, Prakash Publishing House, 1959. 20*s*. [Numerous ref.]

This handbook, designed for the use of Indian post-graduate students, is a combination of textbook and laboratory guide, with a special emphasis on Indian representative material and literature. An outline of mycological techniques, keys to gen., and a list of monographic ref. are appended, with lists of important crop diseases caused by members of the 2 groups.

Kocková-Kratochvílová (Anna). **Kvasinky.** [The Yeasts.]—341 pp., 24 pl. (1 col., 84 fig.), 18 fig., 9 diag., 37 graphs, Bratislava, Czechoslovakia, Slovak Publishers of Technical Literature, 1957. 28·80 Kčs.; 35*s*. [Received Jan. 1960.]

This publication, the scope of which is indicated in short summaries in Russ.,

Germ., and Fr., is in 3 parts dealing, respectively, with morphology and physiology (pp. 7–97), biochemistry (pp. 99–290), and identification (pp. 291–327) of the yeasts. Part 1 includes sections on shape and size of cells, the structure of the yeast cells, reproduction, and pure culture, selection, and storage; part 2 is on chemical composition, metabolism, agglutination and sedimentation, enzymatic products, and nutritient value of yeast.

Each section concludes with a list of ref.

Dudman (W. F.). **Comparison of slime from Tomato and Banana strains of Pseudomonas solanacearum.**—*Nature, Lond.*, **184**, 4703, pp. 1969–1970, 1959.

At the Colonial microbiol. Res. Inst., Port of Spain, Trinidad, the slimes produced by *P. solanacearum* [**38**, 294] strs. *F*2/2*S* and *RE*21*S*, virulent on tomato and banana respectively, were isolated from the cells of the bacterium and the supernatant fluid by Kelman & Husain's technique [cf. **32**, 671; **37**, 444] and fractionated. In 1% solution all 3 fractions from str. *RE*21*S*, but only fraction *S*-II from str. *F*2 2*S*, induced wilting of immersed tomato seedling cuttings. Analyses, including chromatographic, suggested that the slimes consist of mixtures of polysaccharides and a relatively simple peptide. The only qualitative difference between the fractions of the 2 strs. was the presence of rhamnose in *RE*21*S* slime and its absence in *F*2 2*S*, a feature which is considered insufficient to account for their host specificity.

Chanturiya (N. N.). К изучению обмена веществ в листьях Шелковицы, пораженных бактериозом **Pseudomonas mori (Boyer et Lambert) Stev.** [On metabolism in the leaves of Mulberry trees, infected by bacteriosis—*P. mori.*] —*Soobshch. Akad. Nauk Gruz. S.S.R.*, **21**, 3, pp. 305–312, 1959. [19 ref.]

In tests at the Inst. for Plant Protection, Tiflis, Georgian S.S.R., on mulberry leaves of the same age and orientation to the light and infected to different degrees by *P. mori* [cf. **37**, 515], both catalase and peroxidase activity increased in the initial stage of infection. Peroxidase activity was higher in the slightly susceptible var. Tbilisuri and the resistant hybrid Tbilniish no. 2 than in the susceptible Gruziya. The ascorbic acid content was reduced, while the total carbohydrates and the reducing sugars increased. At the same time starch decreased as well as the total N and protein. Water content was less in infected than in healthy leaves, which may have a detrimental effect on the leaf as fodder.

Goto (M.) & Okabe (N.). **Studies on the cellulolytic enzymes of phytopathogenic bacteria. Part 1. On the production of Cx-enzyme. Part 2. Relations between the activity of cellulase 'Cx' and pH, reaction temperature or salts.**—*Ann. phytopath. Soc. Japan*, **24**, 3, pp. 182–188, 6 graphs; pp. 189–193, 8 graphs, 1959. [Jap. Abs. from Engl. summ.]

In studies at Shizouka Univ. already noticed in part [**38**, 179], cellulase was produced by the xanthomonads tested and by all *Erwinia carotovora* strs. to an extent dependent on the str. Most pseudomonads, except *Pseudomonas solanacearum* and *P. panici*, failed to produce detectable cellulase.

E. milletiae and *Corynebacterium sepedonicum* produced cellulase only on potato-carboxymethyl cellulose gel. Cellulase was also produced under cultural conditions in the absence of carboxymethyl cellulose (β-1·4 glucosidic linkage) but was less active.

On 1% carboxymethyl cellulose solution with McIlvaine buffer at pH 3–8, cellulase activity was demonstrated by the loss of viscosity after 30 min. of reaction time between culture filtrates and the substrate. The opt. pH was 5–7, depending on the sp. of bacterium. The effects of temp. and conc. of 5 salts on cellulase activity were also studied.

Bopp (M.). **Hemmung der Induktionsvorgänge bei Wurzelhalsgallen durch 2-thioruracil und 5-bromouracil.** [Inhibition of the induction processes in root-collar galls by 2-thiouracil and 5-bromouracil.]—*Planta*, **54**, 3, pp. 221–232, 1960. [Engl. summ.]

At the Botanisches Institut, Univ. Freiburg i. Br., Germany, the growth of *Agrobacterium tumefaciens* was barely inhibited by the above-mentioned substances at 100–200 μg. ml. despite their assimilation by the organism. At 20 μg./ml. bromouracil affected neither the wound reaction nor development of *Kalanchoe daigremontiana* but prolonged treatment with thiouracil resulted in gradual blackening and partial necrosis of the margins of newly formed leaves [cf. **35**, 287]. The formation of tumours was inhibited by both, but bromouracil was effective only within the 1st 3 days after inoculation, whereas thiouracil was inhibitory for upwards of 5 days. The operative period of bromouracil coincides with that of a temp. of 32° C. for *Vinca rosea*, suggesting that the pyrimidine and increased warmth interfere with the same processes during cell transformation.

It is concluded that bromouracil is specifically implicated in the production of the tumour-inducing principle [**38**, 452 *et passim*], whereas thiouracil is concerned in the growth but not in the actual initiation of the galls.

Donaubauer (E.). **Über eine Mykose der Latenzlarve von Cephaleia abietis L.** [A mycosis of dormant larva of *C. abietis*.] —*Sydowia*, **13**, 1–6, pp. 183–222, 12 fig., 1959.

At the Forstliche Bundesversuchsanstalt, Mariabrunn, Austria, a widespread disease of larvae of the wasp *C. abietis* was found to be caused by *Beauveria bassiana* [cf. **37**, 639]. The fungus penetrates the epidermis and gradually invades the tissues, causing the larva to increase in length by up to 50%. After death of the host coremia develop on the surface. The fungus was cultured and inoculated into the larvae, its lethal effect being enhanced by increasing temp. and R. H.

Fox (C. J. S.) & Jaques (R. P.). **Note on the green muscardine fungus, Metarrhizium anisopliae (Metch.) Sor., as a control for Wireworms.**—*Canad. Ent.*, **90**, 5, pp. 314–315, 1958. [Abs. in *Rec. appl. Ent.*, **47** (A), 11, pp. 448–449, 1959.]

In this account of the possibility of controlling wireworms (*Agriotes obscurus* and *A. sputator*) by *M. anisopliae* [**38**, 348] the methods used to multiply the fungus are given. Success was not achieved in the field, environment rather than the quantity of the fungus available being the limiting factor.

Buchli (H.). **L'effet du champignon parasite Antennopsis gallica sur les jeunes colonies de termites.** [The effect of the parasitic fungus *A. gallica* on young Termite colonies.] —*C.R. Acad. Sci., Paris*, **250**, 7, pp. 1320–1321, 1960.

For the 1st time since 1952 *A. gallica* was observed in 1959 in a large colony of *Reticulitermes l. santonensis* [**32**, 126] at Chatelaillon-Plage (Charente-Maritime), causing heavy depredations and destroying the imagos in 75% of the foundations of primary colonies. These observations suggested the possibility of utilizing the fungus for the large-scale control of termites, especially those propagated exclusively by imagos, e.g. *Calotermes flavicollis* (a noxious pest of vines in Europe) and many tropical spp. Inoculation experiments are in progress with *C. flavicollis* and so far the parasitized colonies have succumbed after the lapse of 3–12 months.

Crop protection products approval scheme. Approved list 1959–60.—64 pp., London, Ministry of Agriculture, Fisheries, and Food, 1959.

On pp. 5–25 of the 16th edition of this publication [cf. **35**, 912] the products approved are listed in sections, in alphabetical order of the common or chemical

names. A general note at the head of each section refers to any precautions to be taken with the chemicals, and lists the pests, diseases, or weeds reasonably or partially controlled by each substance. The proprietary names of products are given, together with abbreviated manufacturers' names, listed in full on pp. 34–35. There is a detailed index, pp. 35–64.

Chamberlain (E. E.) & Atkinson (J. D.). **Certification of therapeutants and plant hormones.**—*Inform. Ser. Dep. sci. industr. Res. N.Z.* 13, 18 (unnumbered) pp., 1959.

The 4th edition of this list [cf. **38**, 301].

Richtlinien für die Pflanzenschutzarbeit 1959. [Instructions for plant protection work in 1959.]—*Pflanzenarzt*, **12**, Sondernummer 2, 25 pp., 1959.

These directives for the control of pests and diseases of cultivated plants in Austria follow the customary lines [cf. **38**, 452], and detailed fruit spraying schedules are again included.

Schmidt (H.) & Meltzer (H.). **Vergleichende biologische und chemische Untersuchungen von Quecksilberhaltigen Trockenbeizmitteln—ein Beitrag zur Beizmittelprüfung.** [Comparative biological and chemical investigations of mercurial dusts—a contribution to fungicide testing.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F. **13**, 8, pp. 150–153, 1 graph, 1959. [Russ., Engl. summ.]

At the Biologischen Zentralanstalt Berlin der Deutschen Akademie der Landwirtschaftswissenschaften, a biological test using *Cladosporium cucumerinum* (cf. Schmidt, *NachrBl. dtsch. PflSchDienst, Berl.*, N.F. **10**, p. 197, 1956) gave results in agreement with those obtained by chemical analysis of dressed cucumber seed samples for Hg content.

Estienne (V.) & Hennebert (G. L.). **Perspectives des composés organiques de l'étain en phytopharmacie.** [Outlook for organic compounds of tin in phytopharmacy.]—*Agricultura, Louvain*, Sér. 2, **7**, 4, pp. 483–494, 1959. [Flemish, Engl. summ. 26 ref.]

The increasing use of tin compounds prompted this survey of available information on their status in relation to the requirements for a good fungicide [**38**, 457]. At the Laboratoire de Phytopathologie, Univ. Louvain, Belgium, 2 triethyl- and 2 tributyl-tin compounds and brestan (Hoechst) were tested against *Botrytis cinerea*, from damped-off flax, and *Penicillium* sp. The 2 1st-named were the most effective against *B. cinerea*, suppressing mycelial growth at 0·2 mg./l. At 0·2 and 0·5 mg. *P.* sp. was also more sensitive to the triethyl than to the tributyl compounds, but at 1, 2, and 5 mg. the position was reversed.

Sijpesteijn (A[ntje] K.) & Janssen (M. J.). **On the mode of action of dialkyldithiocarbamates on moulds and bacteria.**—*Leeuwenhoek J. Microbiol. Serol.*, **25**, 4, pp. 422–438, 1959. [33 ref.]

In further studies at the Organisch Chemisch Instituut T.N.O., Utrecht [cf. **37**, 15; **38**, 124, 453], with *Aspergillus niger, Glomerella cingulata, Fusarium oxysporum*, and *Bac*[*illus*] *subtilis* as test organisms, it was found that in the action of sodium dimethyldithiocarbamate (Na DDC) the formation of its 1:1 and 1:2 complexes with Cu^{++} from the medium plays a decisive part. These have generally greater toxicity than NaDDC, but the response varies with the sensitivity of the test organism. The activity of higher homologues of NaDDC depends on the solubility of their 1:2 complexes, and the mode of action of the dialkyldithiocarbamates is comparable with that of oxine and pyridine-2-thiol-N-oxide.

Davis (D.), Becker (H. J.), & Rogers (E. F.). **The chemotherapy of Wheat and Bean rust diseases with sydnones.**—*Phytopathology*, **49**, 12, pp. 821–823, 1959.

At Merck & Co., Inc. Rahway, N.J., it was shown that 3-phenylsydnones inhibit the development of established rust infections, e.g. *Puccinia rubigo-vera* f. sp. *tritici* [*P. recondita*] on Little Club wheat and *Uromyces phaseoli* [*U. appendiculatus*] on Pinto bean (*Phaseolus vulgaris*). Chlorine substituents in the aromatic ring increase chemotherapeutic activity against *P. recondita*, while bean rust control is lessened by most such substituents. Methyl, chloro-, and bromo-substituents at the 4 position prevented control of rust on wheat but not on bean. These chemicals show poor antifungal activity *in vitro*; the fact that they are structural analogues of phenylalanine and glycine suggests that they inhibit disease by changing host metabolism.

Corden (M. E.) & Young (R. A.). **The fungicidal activity and sorption of nabam in soil.**—Abs. in *Phytopathology*, **50**, 1, p. 83, 1960.

In sandy loam artificially infested with chlamydospores of *Fusarium oxysporum* f. *cubense* nabam mixed with the soil had an ED_{50} of 6 p.p.m. air-dry soil, but when applied as a drench (in sufficient water to bring air-dry soil to field capacity, 25%) 99% of it was retained in the top 5 cm. and below this ED_{50} was 600 p.p.m. As a soil mix it was more toxic than maneb (ED_{50}, 18 p.p.m.), zineb (86 p.p.m.), or vapam (9 p.p.m.).

Welvaert (W.). **Grondontsmetting met vapam.** [Soil disinfection with vapam.]—*Verh. Rijksst. PlZiekt. Gent* 3, 45 pp. [? 1959. Engl. summ. 22 ref. Cyclostyled.]

A comprehensive survey is presented of the results of experiments at the Rijkslandbouwhoogeschool, Gent, Belgium, on which the following conclusions are based. In the laboratory in a slightly alkaline sandy soil rich in humus the min. conc. of vapam requisite for total disinfection was 60 p.p.m. [cf. above], which was fully effective in dry-mix form at the low moisture content of 5 ml./250 g.; air-drying, however, completely inactivated the chemical in a conc. solution even at 120 p.p.m. The influence of soil temp. was negligible within a range of 6–20° C.

The injection of the conc. product at 97 ml./sq. m. in tubes of rich soil at a depth of 10 cm. failed to eliminate all the organisms, though a reduction both in numbers and kinds of spp. was observed. Drenching the soil and applying a plastic cover was also generally unsuccessful, penetration seldom reaching a depth of 20 cm. The latter method also gave very variable results in the field on dark brown sandy soil with much humus, though improvements were effected in the treated crops, e.g., of melon infected by *Fusarium* spp. *F. oxysporum*, *F. culmorum*, and *F. solani* were isolated from the soil besides a number of other well-known fungi.

Martin (J. T.). **Investigations on plant cuticles.**—*Rep. agric. hort. Res. Sta. Bristol, 1958*, pp. 102–106, 2 pl. (4 fig.), [1959.]

At the present stage of this work [cf. **38**, 305] assessments are being made, on a quantitative chemical basis, of the nature of the cuticle in a wide range of plants; the leaves of 7 spp. and the fruits of 3 of these have been studied. Interest centres mainly on leaves, and it is hoped to gain a better understanding of the role of the cuticle in the retention, penetration, and occasional damaging effects of spray chemicals, and in the host-parasite relationship.

Somers (E.). **The uptake of fungicides by fungal spores.**—*Rep. agric. hort. Res. Sta. Bristol, 1958*, pp. 106–109, 1 graph, [1959.]

This work has already been noticed [**38**, 454].

Woodcock (D.) & Byrde (R. J. W.). **The metabolism of aromatic compounds by fungi.**—*Rep. agric. hort. Res. Sta. Bristol, 1958*, pp. 110–114, [1959.]

This report of the breakdown of several complex organic compounds within the fungus cell covers further exploratory work (cf. *Biochem. J.*, **72**, pp. 344–348, 1959) into the phenomenon of detoxication, of fundamental importance in studies of fungicidal action.

Govindaswamy (C. V.). **Preliminary experiments on fungitoxicity and phytotoxicity of some petroleum oils.**—*Rep. agric. hort. Res. Sta. Bristol, 1958*, pp. 131–138, [1959.]

In experiments with emulsions of 3 grades of mineral oil, both diesel oil and spindle oil at 1% caused marked reduction of spore germination of *Botrytis cinerea* and some reduction in that of *Cladosporium fulvum*; white oil up to 10% had little effect on germination of either; *Alternaria tenuis* was practically unaffected by the emulsions. The effect of oil on germ tube growth was similar to that on germination. All the emulsions inhibited mycelial growth of these fungi and of *Penicillium* sp., but did not check sporulation in *C. fulvum*. Conidia produced in conidial pustules of *Sclerotinia fructigena* on oil-treated apple fruits were highly resistant to removal by rain. The emulsions did not hamper ascospore discharge by *Nectria galligena* or *Pseudopeziza ribis*.

Under glass both white oil and diesel oil at 1% were harmless to cucumber, tomato, bean, barley, gooseberry, blackcurrant, apple, tea, and banana [cf. **36**, 40]. At 5% spindle oil was generally more phytocidal than the other 2. At 10% all damaged all the crops, with the exception of white oil, harmless to barley and banana. Gooseberry and apple were the most susceptible to oil damage.

Mapother (H. R.) & Tapscott (Ann R.). **Spray application problems : L. The use of fluorescent materials as tracers in spray liquids : experiments with Abaca (Musa textilis, Nee).**—*Rep. agric. hort. Res. Sta. Bristol, 1958*, pp. 142–151, 2 pl. (12 fig.), [1959.]

In an abaca plantation in N. Borneo the tracer materials saturn yellow and Zn 8-hydroxyquinolate, incorporated in sprays for the control of *Pentalonia nigronervosa*, vector of bunchy top virus disease of *M. textilis* [**38**, 293], permitted satisfactory estimation of spray cover by examination of sample leaves under ultra-violet light. Though in its present form the technique is not quantitative it is valuable in assessing the initial cover afforded by a spray. It can with advantage be combined with chemical estimation, which by itself does not differentiate between equal deposits resulting from regular and irregular cover.

Cobbald (T. E.). **Spray application problems : LI. A prototype low-pressure twin fluid atomizer.**—*Rep. agric. hort. Res. Sta. Bristol, 1958*, pp. 152–153, 1 pl., 1 fig., [1959.]

The nozzle of this sprayer, in which atomization is effected by the passage of air at speeds in excess of 200 m.p.h., has a bore of 6 in., occluded at its outlet by a double conical structure leaving an annular orifice. The liquid, delivered through 12 rectangular nozzles ($\frac{3}{8} \times \frac{1}{8}$ in., giving a high surface/vol. ratio), is atomized by the vigorous shearing action of the air as it passes through a system of 12 curved tongue-shaped vanes located in the orifice. These impart a swirling motion to the air stream, which diffuses at a wider angle than it would in the absence of a tangential velocity component. With an air throughput of approx. 1,800 c.f.m. and a stagnation pressure of approx. 2 lb./sq. in. as much as 24 gal. spray liquid/min. can be broken up. The liquid supply pressure for this throughput is 30 lb./sq. in.

Potts (S. F.). **Equipment for pest and disease control.**—*Unasylva*, **13**, 2, pp. 89–101, 11 fig., 3, pp. 138–154, 5 fig., 1959.

In this extensive study of present practices in N. America fundamental aspects of application are discussed, including particle size of insecticides and its relation to application, distribution and deposit, nozzle delivery as related to orifice type, and analysis of mist blower application. Detailed descriptions are given of different types of ground apparatus (mist blowers, compressed air, and knapsack sprayers) and of the construction and operation of aerial equipment. Some of the terms used are defined.

Koch (H.). **Anerkannte Pflanzenschutzgeräte und -geräteteile.** [Approved plant protection equipment and component parts.]—*NachrBl. dtsch. PflSchDienst (Braunschweig)*, *Stuttgart*, **11**, 9, pp. 129–136, 7 fig., 6 graphs, 1959.

On the same lines as before [cf. **38**, 59].

Tarnovich (N. K.). Новые машины. [New machines.]—Защ. Раст., Москва [*Zashch. Rast., Moskva*], **4**, 6, pp. 19–21, 3 fig., 1959.

Among agricultural machines developed at the All-Union sci. Res. Inst. for Plant Protection in 1958–9 was a horse-drawn motor sprayer for use in mountain orchards with gradients of up to 30°, capable of spraying 5–7 ha. per day; a mobile automatic orchard sprayer with 3 booms mounted transversally on an upright shaft and a range of up to 7–8 m.; and a soil fumigator recommended for use in the control of potato wart [*Synchytrium endobioticum*], and capable of treating 0·5–0·6 ha./hr.

Lal (K. B.). **Plant protection in India.**—*F.A.O. Pl. Prot. Bull.*, **7**, 10, pp. 134–137, 1959.

In this general review it is stated that some 150 fungus, bacterial, and virus diseases cause damage to crops in India. A Directorate of Plant Protection, Quarantine, and Storage was established in 1946 [cf. **26**, 176]. Assistance by the Central Government to the plant protection organizations of the States and Union territories of the Republic of India takes the form of financial subsidies, the provision of pesticides at cost price, and the loaning of spraying and dusting machinery at prescribed rates. Arrangements are also made for the *ad hoc* provision of technical personnel for disease surveys. The Government has established Central Commodity Committees, which assist financially in projects of research and plant protection, and there are research institutes dealing with particular crops in many localities.

Oort (A. J. P.). **Over de termen primair en secundair ziek in de fytopathologie.** [Concerning the terms primary and secondary disease in phytopathology.]—*Tijdschr. PlZiekt.*, **65**, 4, pp. 142–146, 1959. [Engl. summ.]

The author suggests that these terms should be used only in connexion with seed-borne systemic infections of the continuous type, such as virus diseases of potato, bean common mosaic virus, or *Peronospora destructor* on onion. Primary infection is contracted during the growing season, while secondary infection results from the presence of the pathogen in the seed or other propagules.

With discontinuous disease cycles, e.g. *Ascochyta pisi* on pea [**37**, 258], the stage of the disease resulting from infected seed should not be described as secondary infection.

Rademacher (B.). **Einige Beispiele für Kettenwirkungen nach Anwendung von Herbiziden.** [Some examples of after effects following the use of herbicides.]—*NachrBl. dtsch. PflSchDienst (Braunschweig)*, *Stuttgart*, **11**, 10, pp. 155–156, 1959. [Engl. summ.]

In tests by the Institut für Pflanzenschutz der Landwirtschaftlichen Hochschule,

Hohenheim, in 1955–58, the performance of maize on heavy loam was studied after applications of hormonal herbicides. Ester formulations (2,4-D butyl glycol ester and 2,4,5-T lactic acid ester, both 1 l./ha.) lessened the tendency to lodging but increased both brittleness and susceptibility to *Ustilago zeae* [*U. maydis*].

Heavy infection by *Ascochyta pinodella* occurred on peas which had been scorched by dinoseb applied in hot weather a few days after heavy rain. It is emphasized that a pre-emergence treatment with TCA reduces the waxy protective surface on the leaves of peas, leaving them particularly susceptible to damage by dinoseb.

KRAMER (C. L.), PADY (S. M.), ROGERSON (C. T.), & OUYE (L. G.). **Kansas aeromycology II. Materials, methods, and general results.**

KRAMER (C. L.), PADY (S. M.), & ROGERSON (C. T.). **III. Cladosporium.**—*Trans. Kans. Acad. Sci.*, **62**, 3, pp. 184–199, 6 graphs; pp. 200–207, 7 graphs, 1959. [42 ref.]

Counts and identification of air-borne fungi [cf. **36**, 775; **38**, 587] were made at Kansas State Univ., Manhattan, from Sept. 1956 to Aug. 1958. Spore counts were obtained on rose bengal streptomycin agar on slides exposed in a Pady Rittis slit sampler, normally for 1, 2, 3, 5, or 10 min., according to the season, and colonies were counted on plates of the same medium exposed in a bacterial electrostatic air sampler. Of 113,667 colonies examined 83,011 were identified to genus and included *Cladosporium* (44·5%), non-sporulating (17·6%), *Alternaria* (12·6%), yeasts (8·4%), *Penicillium* (6·1%), *Aspergillus* (5·4%), and other genera not individually exceeding 1%. The spore census gave 40·9% *Cladosporium*, 24·3% basidiospores, 7·3% yeasts, 5·9% smuts, 4·4% 2-celled hyaline, 3·4% *Alternaria*, 2·9% *Fusarium*, 1·4% 1-celled hyaline, and 1·0% *Cercospora*. Daily readings of both colonies and spores fluctuated considerably according to seasons and the weather, the highest numbers (2,877 spores/cu.ft. and 567 colonies/cu. ft.) being reached after rains.

Cladosporium cladosporioides accounted for over $\frac{1}{2}$ of the *C.* colonies, *C. herbarum* about $\frac{1}{3}$, and *C. macrocarpum* and *C. sphaerospermum* much less. *C.* spores were 80–160/cu. ft. most days from May–Oct., and up to 2,334 after rain; in winter numbers were usually 5–10/cu. ft.

ROSE (GRACE R. F.), HOWDON (JANE B.), & BAYLEY (C. H.). **Observations on the use of copper formate as a rot proofer for Cotton fabric.**—*Text. Res. J.*, **39**, 12, pp. 996–1005, 1 graph, 1959.

A tabulated survey is presented of the results obtained at the Nat. Res. Council of Canada, Ottawa, on which the following conclusions, inter alia, are based. Heating fabric (cotton duck) impregnated with Cu formate [**36**, 47] to provide a min. Cu content of 0·4% confers a considerable degree of resistance to actinic degradation and attack by *Chaetomium globosum*. Autoclaving was found to be preferable to oven treatment which caused appreciable chemical degradation. The protection imparted is attributed to the comparatively substantial conc. of Cu, as Cu_2O, on the fabric rather than to any inherent superiority of Cu formate; Cu in other forms would give equally good results at a comparable strength. The treated cotton was shown to be freely soluble in standard cuprammonium solution and the Cu therein is largely removable by repeated rinsing with dilute NH_4OH. These findings do not support the view of cross-linkage between Cu and cellulose, nor does the observation that the Cu in Cu formate-treated fabrics virtually disappeared during a 4-month period of outdoor weathering. A similar degree of resistance to microbiological deterioration was obtained by incorporation into the surface of the fabric of Cu_2O as produced by reduction of Fehling's solution.

Berard (W. N.), Gautreaux (Floria), & Reeves (W. A.). **Formic acid colloid of methylomelamine as a weather and rot resistant finish of Cotton.**—*Text. Res. J.*, **29**, 2, pp. 126–133, 2 graphs, 1959.

At the Southern Regional Res. Lab., New Orleans, La, resistance to [unspecified] rot was conferred on cotton fabric by the addition of 2·3% acetic acid and a metal salt catalyst (preferably $FeCl_2$ or $CrCl_2$) to an aqueous solution of trimethylomelamine just before finishing by the standard pad, dry, and cure procedure. With 12% resin thus imparted, print cloth retained 100% breaking strength after 21 weeks' soil burial [cf. **33**, 546].

Experimental evidence indicated that the mechanism whereby the acid colloid operates to produce rot resistance is controlled penetration of essentially monomeric methylomelamine which is subsequently polymerized, rather than a continuous surface film. Samples so treated compared favourably with those subjected to partial, full, and cyanoethylation and the wet-cure arigal process [see below], which are all of known efficiency.

Ruperti (A.). **Rot-resistant finishes for Cotton.**—*Text. Res. J.*, **30**, 1, pp. 68–69, 1960.

Exception is taken to the claim for superiority of the acid colloid of methylomelamine method over the arigal process (Ciba Ltd., Basle, Switzerland) [see above]. Among the drawbacks of the former are the damage caused to the fibres and relative instability of the solution (max. stability of 8 hr. compared with a week for arigal), which can hardly be offset by the advantages of a shorter fixation time and applicability of conventional equipment.

Dahl (S.) & Kaplan (A. M.). **Studies of leather fungicides.**—*J. Amer. Leath. Chem. Ass.*, **53**, 2, pp. 103–118, 2 diag., 3 graphs, 1958.

This is a joint progress report from the Nat. Bureau of Standards, Washington, D.C., and the Quartermaster Res. and Engineering Command, Natick, Mass., dealing with investigations on the efficiency for [unspecified] mildew control [**35**, 703] of 2 series of compounds structurally related to tetrachlorohydroquinone and 4-nitrophenol. Among 10, all with a 2,3,5,6-tetrachlorobenzene ring in common but with different substituents on carbons 1 and 4, the most effective combination was OH,NO_2. Mildew-preventive activity was also associated with the $1,4OH,NO_2$ combination in a group of 11 aromatic nitro compounds without the tetrachloro structure. The efficacy of bis(4-nitrophenyl)carbonate and bis(2-chlor-4-nitrophenyl)carbonate is apparently attributable to their decomposition into the corresponding free phenols under hot, moist conditions. They are of interest as leather fungicides because they are colourless and probably non-toxic, thereby obviating certain disadvantages of 4-nitrophenol. Analytical methods for the determination of these compounds and the results of their performance in leaching and volatility tests are presented.

Iwamoto (H.) & Kikuchi (M.). **Prevention of mold growth on the export goods. VIII. Fungicides.**—*Hakkô Kyôkaishi*, **17**, pp. 74–77, 1959. [*Chem. Abstr.*, **53**, 22, col. 22691 d, 1959.]

In this further series of experiments at the Fermentation Res. Inst., Chiba, Japan [**38**, 66], the growth of all the moulds investigated was inhibited by *o*-phenylphenol at 0·02%, and by 2- and 4-chloro-6-phenylphenol at 0·001%. Effects similar to those of *o*-phenylphenol were produced by *p*-chloro-*o*-cresol, while 4-chloro-2-nitrophenol acted like the 2 chlorophenylphenols. Equal to the strongest of the foregoing was 4,6-dinitro-*o*-cresol, while *p*-chlorothymol was even more toxic.

Comparatively resistant to *o*-phenylphenol and its derivatives were *Rhizopus nigricans* [*R. stolonifer*], *Dipodascus albidus*, *Aspergillus flavus*, *A. niger*, *A. terreus*,

Penicillium javanicum, *A. japonicus*, *Fusarium oxysporum*, and *Poria vaporaria*, while *Absidia regnieri*, *R. stolonifer*, *D. albidus*, *Aspergillus flavus*, *A. niger*, *A. terreus*, *Chaetomium globosum*, *Paecilomyces varioti*, *F. oxysporum*, and *P. vaporaria* reacted similarly to the cresol group.

LUNDGREN (D. C.). **Mechanism of growth of bacteria and fungi.**—*Tappi*, **42**, 8, pp. 171–174A, 1959.

A general survey of the subject in relation to spoilage organisms in paper mills, where moulds have been demonstrated as associates of slime-forming bacteria.

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, **7**, 10, pp. 138–139, 1959.

A resolution of 2 July 1959, published in the *Diario Oficial*, **235**, 15, on 17 July 1959, amends Exterior Quarantine No. 6 of 17 July 1927 by adding hoja blanca virus disease of rice to the 6 cereal diseases the introduction of which into Mexico is to be prevented, and prohibiting the importation of rice seed or paddy rice into Mexico except from U.S.A. [cf. **7**, 416].

Supreme Resolution No. 68 of 11 April 1959 (*El Peruano* 27 April 1959) establishes regulations for the importation into Peru of plants and plant products, subject to legislation.

Amtliche Pflanzenschutzbestimmungen. [Official plant protection regulations.]—*Pflanzenschutz*, N.F., **12**, 4, pp. 137–200; **13**, 1, pp. 1–60, 1959.

These publications follow the customary lines [cf. **38**, 668].

BAYLIS (G. T. S.). **Effect of vesicular-arbuscular mycorrhizas on growth of Griselinia littoralis (Cornaceae).**—*New Phytol.*, **58**, 3, pp. 274–280, 1 pl., 1 graph, 1959.

The endophyte of *G. littoralis* is a phycomycete which made only transient growth into agar but survived in moist soil for 26 months. In 2 consecutive experiments at the Univ. Otago, New Zealand, using sterilized soil in which ectotrophic mycorrhiza were necessary for sustained growth of *Pinus radiata* [cf. **38**, 184], mycorrhizal *G. littoralis* grew better over a 1–2 yr. period than non-mycorrhizal, which became moribund. Under these conditions seedlings of a non-mycotrophic tree, *Myrsine australis*, grew steadily. Mycorrhizal pine and *G. littoralis* were consistently higher in P and lower in N than non-mycorrhizal. Enhanced P uptake thus appears to have been the main favourable effect of both types of mycorrhiza.

MOSSE (BARBARA). **The regular germination of resting spores and some observations on the growth requirements of an Endogone sp. causing vesicular-arbuscular mycorrhiza.**—*Trans. Brit. mycol. Soc.*, **42**, 3, pp. 273–286, 4 pl. (10 fig.), 3 fig., 1959. [25 ref.]

At East Malling Res. Sta., Kent, aseptically grown apple and strawberry seedlings inoculated with surface sterilized spores of *E.* sp. produced typical vesicular-arbuscular mycorrhiza [**37**, 440]. Sporocarps of the fungus were multiplied by growing strawberry seedlings or plants in pots until the roots were well developed, removing them with the soil ball intact, pushing 30–50 sporocarps into the wet soil (2 parts loam+1 part sand, autoclaved) round the roots, and repotting the plant; after 4–6 months of vigorous growth more than 2,000 new sporocarps were produced in association with young roots. Resting spores with thick yellow walls and highly vacuolated contents were dissected from sporocarps stored at 5° C., surface sterilized with chloramine T+streptomycin and a trace of detergent, rinsed in sterile water, and placed on cellophane squares, which were transferred to a larger sheet of cellophane covering a soil-agar mixture in the centre of a Petri plate. After 2–4 days at 20° C. (and sufficient moisture) 80–100% germinated. Growth was stimulated by dialysates from biologically active soil+agar plates and from sonically disintegrated roots.

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